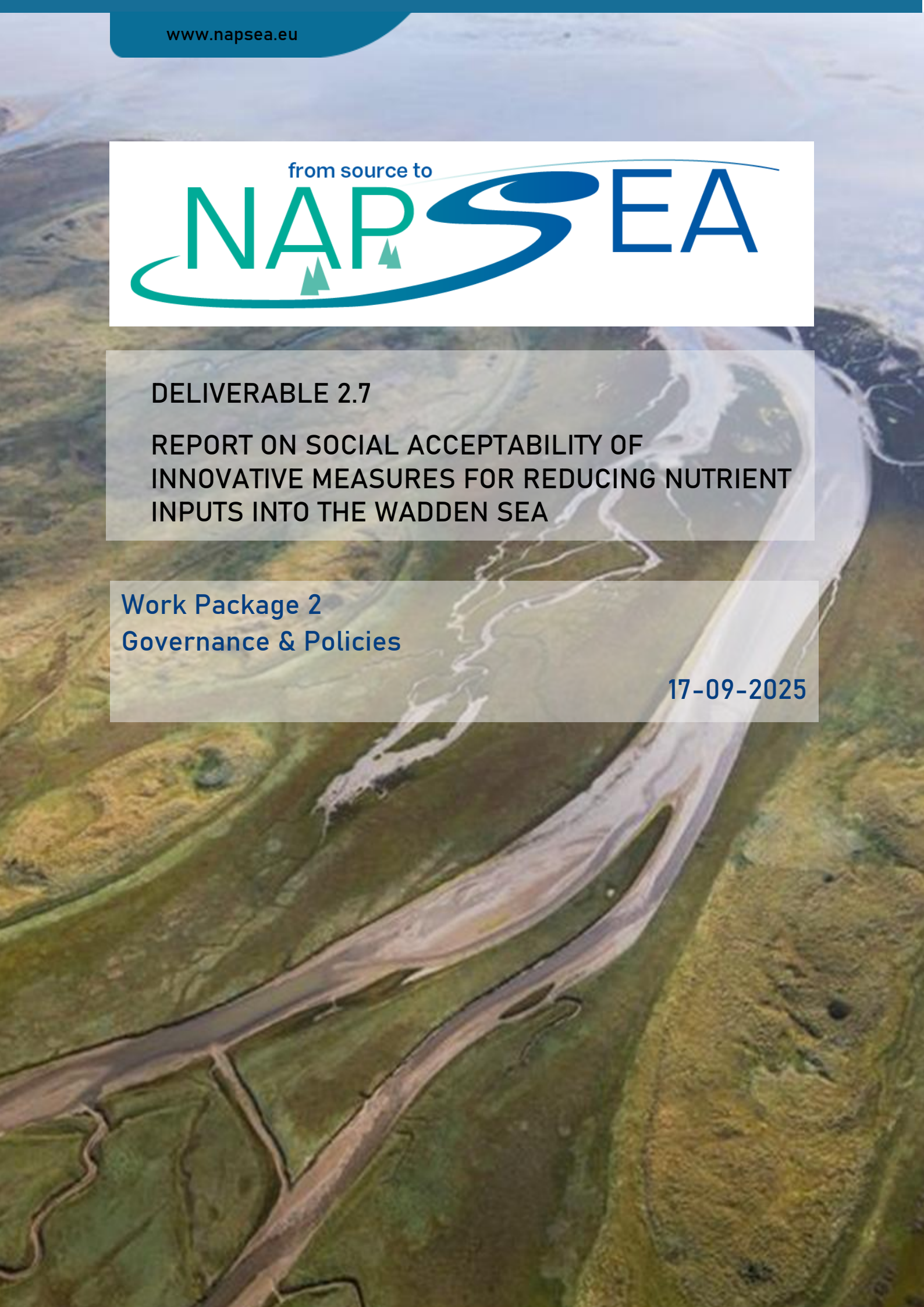

from source to NAPSEA

DELIVERABLE 2.7

REPORT ON SOCIAL ACCEPTABILITY OF INNOVATIVE MEASURES FOR REDUCING NUTRIENT INPUTS INTO THE WADDEN SEA

Work Package 2
Governance & Policies

17-09-2025

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Approved by	van der Heijden, L.H. (Deltares)
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Abstract	Study on social acceptance in the Rhine basin to better understand what hinders and enables the implementation of nutrient reduction measures from the perspectives of farmers and citizens.
Keywords	Social acceptance, approval of measures, reduction of nutrient input, including nitrogen, and phosphorus, exchange, communication.

[1] In the Grant Agreement, the title of this deliverable was *Report on social acceptability of innovative measures for reducing nutrient inputs into the Wadden Sea.* It was decided to change acceptability to acceptance, because the focus of the study is on identifying social acceptance (how accepted are the measures currently) rather than acceptability (the degree to which a measure is considered appropriate).

Executive Summary

This deliverable investigates the level of social acceptance of nutrient reduction measures in agriculture from the perspectives of farmers and citizens in Germany and the Netherlands. The geographical focus of the study is the Rhine River basin, as the Rhine is one of the main tributaries to the Wadden Sea. This helps us understand how aware people (farmers and citizens) are of the continuum of rivers (and the nutrients they may hold) into the Sea.

The study setup involved surveying citizens (N = 1339) and 29 interviews with farmers in Germany and the Netherlands, located near the Rhine River basin. The sample was selected by filtering for a representative balance in farm types in terms of conventional/ organic farming, size of farms and geographical distribution. The interviews have been analysed using thematic coding and interpretive analysis to capture a nuanced understanding of farmers' concerns and motivations. The citizen survey has been analysed qualitatively and quantitatively.

Better understanding which nutrient-reduction measures are accepted is crucial for learning how they can be scaled up, complemented, and implemented overall. Especially in the interviews with farmers, we recorded different reasons for acceptance of measures, such as values, intrinsic motivation related to the enabling environment. The information gathered from farmers is compared with the citizens' assessment of what they consider sensible measures for nutrient reduction, what they would be willing to adapt in their lifestyle to support less nutrient-intensive farming, and what kind of effects they expect from stricter nutrient-reduction measures.

Amongst farmers, we found a strong overall willingness to change if the measures appear logical and are perceived by the farmers as proportionate compared to actions taken in other polluting sectors. Most farmers expect ‘fair’ compensation for loss of revenue in their farming activities due to the measures. Generally, the implementation of measures is more welcome if there is some degree of flexibility for farmers to decide when and how to implement the measures. Amongst the citizens, there is clear support for the current measures, with one third of citizens supporting stricter measures. However, they expect this will result in a higher administrative and financial burden for the farmers. Stronger political steering, supportive policies, and targeted transformations in farming systems are needed to drive more sustainable land use with reduced nutrients. Differentiated nutrient strategies, effective incentive schemes, and fair compensation for freshwater- and biodiversity supportive measures will be key to unlocking biodiversity potential and securing farmer participation in conservation efforts.

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LIST OF ACRONYMS

Abbreviation	Explanation
AESs	Agri-environmental schemes
AUKM	Agrarumwelt- und Klimamaßnahmen
CAP	Common Agricultural Policy
CAP4GI	Common Agricultural Policy for Green Infrastructure
DE	Germany
EU	European Union
MINAS	Mineral Accounting System of the Netherlands
NMI	Nutriënten Management Instituut (Netherlands)- *Soil for life*
NAPSEA	The effectiveness of Nitrogen And Phosphorus load reduction measures from Source to sEA, considering the effects of climate change
N	Nitrogen
NL	Netherlands
P	Phosphorus
SURE-Farm	Sustainable and Resilient EU Farming Systems
WP	Work Package

1. Introduction

This project addresses the effectiveness of Nitrogen and Phosphorus load reduction measures from Source to sEA, considering climate change's effects (NAPSEA). The primary objectives of NAPSEA are to support national and local authorities in selecting effective measures to reduce nutrient loads and create political support for their execution. The project employs an integrated approach from pollution sources to the sea, considering governance, nutrient pathways and measures, and ecosystem health. Geographically, the project focuses on the Wadden Sea catchment area, with specific case studies for the Rhine, Elbe, Hunze, and the Wadden Sea itself. NAPSEA serves as a platform to show practices in implementing socially acceptable, sustainable, and efficient measures.

Work Package (WP) 2 aims to analyse the policy and socio-economic aspects of nutrient management. The envisaged outcome of WP 2 is an improved support, with a set of guidelines, for the policy vision of clean European seas by 2030.[2] Efforts to combat eutrophication have significantly advanced in Europe, but certain challenges remain, such as disjointed policies, adverse effects of high nutrient inputs, and limited public acceptance of measures. The task of WP2 includes analysing barriers and highlighting good practices for implementing sustainable and effective strategies to reduce marine pollution – encompassing administrative, legal, financial, technical, and social dimensions.

The NAPSEA project primarily involves various modelling-focused tasks and evaluations of measures from a quantitative way. It was also crucial for the project to include social acceptance (as part of WP2) to capture the perspectives of those who implement part of the nutrient reduction measures (farmers) and the social acceptance of the measures more generally (citizens). For the successful implementation of a measure, it matters whether the measure is endorsed by key actors, and who shows support for it (e.g., politicians, financiers, and the public), as well as how.[3] The focus of our work lies on the public (citizens as consumers) and farmers to explore their viewpoints on the role in reducing nutrients. Our focus is on farmers because the current European agricultural sector (still) leads to nutrient overload in the water systems. While many measures are being implemented, the level of nutrient influx into soil and waterways from agricultural activities remains high.[4]

In this study, we investigate the level of social acceptance as it influences public support and, ultimately, the willingness of farmers to implement measures. We do so by analysing primary data (from interviews with farmers and surveys with citizens) that helps us understand what hinders and enables the implementation of nutrient reduction measures.

1.1. Why are nutrient reduction measures necessary in agricultural activities?

Excess nitrogen and phosphorus in the environment pose significant ecological problems, including the eutrophication of water bodies such as the Wadden Sea. Eutrophication leads to algal blooms, reduced oxygen levels, and biodiversity loss.[5] Sources of nitrate and phosphorus include agricultural runoff, industrial discharges, urban wastewater (including stormwater overflows), and atmospheric deposition. These nutrients disrupt sensitive ecosystems in the Wadden Sea, threatening marine species and coastal habitats. Efforts to address the issue include stricter wastewater treatment regulations, promoting sustainable agricultural practices, and targeted monitoring programs to track nutrient levels. These measures aim to reduce nutrient loads and mitigate their environmental impact.

This report focuses on the nutrient reduction measures that can be implemented in agricultural practices and processes. Studies show that rivers are the primary source of nutrients causing eutrophication in the Wadden Sea, with agriculture being a major contributor to these riverine nutrient loads (mainly nitrate and phosphorus as main contributors),[6] significantly contributing to nonpoint (diffuse) nitrogen flows to coastal waters, either as direct runoff or airborne pollutants.[7] The agricultural sector contributes to nitrogen and phosphorus pollution due to the excessive use of fertilisers and improper manure management. Nutrients from farms often leach into rivers and groundwater, or run off into nearby water bodies, exacerbating eutrophication. To address this, practices like precision farming, buffer strips, and cover cropping are promoted to minimise nutrient losses. Regulatory measures, such as limits on fertiliser application and manure spreading, are also implemented to control emissions. Additionally, advisory programs educate farmers about sustainable nutrient management, while subsidies support the adoption of environmentally friendly practices. These initiatives aim to strike a balance between agricultural productivity and environmental sustainability.

[2] European Commission, 2025.
[3] Definition adapted from Jones et al., 2017.
[4] EEA, 2023.
[5] Chislock, M.F- et al. (2013)
[6] van Katwijk, M.M. et al., 2024.
[7] Senckenberg Research Institute and Natural History Museum, 2023.

The reason for focusing on agriculture in this study is, on the one hand, due to the pivotal role that agricultural activities play in nutrient loads, and on the other hand, because of the societal attention and influence that have emerged over the last few years regarding food production.[8] We, however, do not want to undermine other sources and processes leading to high nutrient concentration (mentioned above), and that is addressed in the citizens' survey.

1.2. Background of nutrient reduction policies

To address the social acceptance of nutrient reduction measures, it is essential to understand the enabling environment of policies and the specific setting in which the measures are implemented. For more information on the feasibility of specific measures, a separate deliverable (D2.2) of the NAPSEA project gives insights.[9]

This sub-chapter outlines the development of nutrient reduction policies in Germany and the Netherlands to date. Agri-environmental schemes (AESs) aim to harmonise agricultural production with environmental goals. In the EU, AESs are embedded in the CAP and are now referred to as Agri-Environment-Climate Measures, reflecting their integration of climate mitigation and adaptation.

1.2.1. Germany

In recent decades, increasing intensification in agriculture has led to environmental and yield-related challenges, such as nutrient surpluses from high livestock densities and stagnating crop yields due to narrow crop rotations.[10] In response, the EU reformed its Common Agricultural Policy (CAP) in 2021 to emphasise environmental performance through new instruments, such as eco-schemes and a restructured so-called green architecture, which came into effect in 2023. However, the reform's complexity, stemming from historical path dependencies and overlapping policy tools, has led to implementation difficulties and raised concerns about legal issues, such as double funding.[11] Further complicating is the fact that, although the expansion and financial strengthening of the agricultural and climate-related measures (Agrarumwelt- und Klimamaßnahmen: AUKM) at the national level can be partially considered successful, only just over 60% of the funds for the organic schemes were used in Germany in the application year 2023.[12] Further reform is necessary and that innovative support measures are required to address the diverse objectives effectively.[13] At the same time, farm managers in Germany face a new situation: increasing regulatory requirements and increasingly strict demands from the food retail trade are currently offset by comparatively high producer prices.[14] To operate profitably and sustainably in the medium term and secure the long-term existence of well-positioned farms, examining and implementing innovations in environmental and resource protection on farms using new agricultural policy support instruments is essential.[15]

From the CAP, an annual share of approximately €6.2 billion is available for Germany. The protection and preservation of landscapes and biodiversity have been part of the nine specific objectives of the CAP since the beginning of the current funding period.[16] In Germany, nutrient reduction measures in agriculture require critical reassessment due to persistent nutrient surpluses, especially nitrogen and phosphorus, which continue to impact water bodies despite existing regulations. The 2021 update of the German Fertiliser Ordinance (Düngeverordnung) tightened application standards, yet monitoring data indicate ongoing exceedances of nitrate thresholds in groundwater in several federal states.[17] This suggests that while technical regulations exist, their effectiveness is hindered by gaps in enforcement, regional variation, and limited farmer acceptance. Moreover, current measures often focus on compliance rather than systemic change, neglecting socio-economic incentives and behavioural aspects of farmers.[18]

1.2.2. Netherlands

Over the past decades, the Netherlands has developed one of Europe's most intensive and specialised agricultural systems, characterised by high livestock densities and a strong export orientation. This intensification has led to significant environmental challenges, particularly concerning nutrient surpluses and nitrogen

[8] Henley & Jones, 2024.
[9] Gericke, A., Leujak, W., NAPSEA Deliverable D.2.2, 2023.
[10] Kanter et al., 2020; Garnier, Billen & Lassaletta, 2021.
[11] Monteleone, Camaioni & Tarangioli, 2023.
[12] Reiter, 2024.
[13] Becker, Nieberg & Sanders, 2023.
[14] Heinrich Böll Stiftung, 2025.
[15] Tietjens et al., 2024.
[16] Federal Ministry of Food and Agriculture (BMEL), 2024.
[17] UBA, 2025.
[18] Zindler et al., 2023.

emissions.[19] The excessive application of nitrogen (N) and phosphorus (P) fertilisers has resulted in leaching and runoff into groundwater and surface waters, contributing to eutrophication and biodiversity loss.[20]

The Dutch government has implemented various nutrient management regulations in response to these challenges over the years. Notably, the Mineral Accounting System (MINAS) was introduced in the 1990s to monitor and control nutrient surpluses at the farm level.[21] However, despite these efforts, nutrient emissions remain a pressing issue, necessitating more integrated and practical approaches.[22]

The CAP for 2023–2027 has enabled all Member States to enhance their environmental performance by implementing eco-schemes. These schemes provide financial incentives for farmers to adopt sustainable practices, including precision farming, cover cropping, and establishing buffer strips.[23] Nevertheless, the complexity of the CAP's architecture and the administrative burden associated with eco-schemes have raised concerns about their practical implementation and effectiveness. To address the persistent problem of nutrient surplus, the Dutch government has also proposed a "nutrient balance" approach to track soil nutrients and greenhouse gas emissions accurately. Pilot programs are set to begin in 2025, focusing on goal-oriented measures rather than prescriptive regulations, but have not commenced yet (as of August 2025) due to ongoing federal uncertainties regarding priorities in agricultural policies. If the nutrient balance approach is applied, this shift reflects a broader move towards performance-based policies that align environmental objectives with agrarian productivity.[24]

Despite these initiatives, the agricultural sector continues to face ongoing challenges, including public opposition to intensive farming practices and legal pressures to meet environmental targets. The recent decision to delay nitrogen emission reduction targets from 2030 to 2035 has sparked controversy, highlighting the tension between agricultural interests and environmental commitments.[25] As the Netherlands navigates these complexities, developing innovative measures that effectively balance economic viability with environmental sustainability becomes increasingly important.

The limited long-term success of instruments like the MINAS system, along with ongoing breaches of European nitrate directives, underscores the need to revisit nutrient reduction strategies in the Netherlands. Despite earlier policy innovations, nitrogen surpluses and ammonia emissions remain high, particularly from the livestock sector, leading to significant ecological stress on Natura 2000 sites.[26] While recent initiatives aim to transition towards a more circular agriculture, the effectiveness of current measures is often constrained by a lack of farm-level flexibility and insufficient integration of scientific and local knowledge. Furthermore, farmer resistance and public protests regarding recent changes to the CAP reflect a disconnect between policy design and the socio-economic realities of rural communities.[27] Therefore, a reassessment that emphasises co-designed, goal-oriented nutrient management is essential for environmental and social sustainability.

1.3. Why measure social acceptance of nutrient reduction measures?

Understanding social acceptance of nutrient reduction measures is crucial because the success of environmental policies depends not only on their technical effectiveness but also on public and stakeholder support. Even well-designed and scientifically sound measures can face resistance if perceived as unfair, overly restrictive, or economically burdensome. Social acceptance influences the willingness of farmers, local communities, and other actors to adopt and sustain nutrient-reducing practices. It also shapes political feasibility, policy legitimacy, and long-term compliance. Therefore, integrating social dimensions into environmental governance is essential for lasting improvements in water quality and ecosystem health. Social acceptance refers to the degree to which stakeholders and the broader community support and embrace a policy or intervention. Social acceptance is shaped by three core elements that form its foundation: it entails “someone (an acceptance subject) accepting or approving something (the acceptance object) within specific contextual or baseline conditions (acceptance context)”.[28]

To date, research has focused on the motivations for implementing environmental measures in agriculture, specifically examining psychological, social, and institutional factors that influence farmers' acceptance of these

[19] van Grinsven, Spiertz, Westhoek, Bouwman & Erisman, 2013.
[20] Verloop, van den Brink & Gielen, 2025.
[21] Schröder & Neeteson, 2008.
[22] OECD, 2023.
[23] Jongeneel, Gonzalez-Martinez, 2023.
[24] van der Hoek, 2024.
[25] Politico, 2025.
[26] van Grinsven, ten Berge & Dalgaard, 2025; Rijksinstituut voor Volksgezondheid en Milieu, 2023.
[27] Wageningen University & Research, 2021.
[28] Schäfer & Keppler, 2013, p. 16.

measures.[29] Research on agri-environmental policies has widely acknowledged the significance of individuals accepting regulatory frameworks (which partially include mandatory measures). Still, no study applies a specific concept of measuring social acceptance to nutrient reduction measures in agriculture. Social acceptance is commonly understood through concepts like acknowledgement, approval, agreement, affirmation, or consent,[30] which partially differentiate between attitudinal acceptance and behavioural acceptance.[31]

Massfeller et al. (2022) studied results-based AES among arable farmers where farmers receive compensation after certain contracted environmental measures are implemented, in the German state of North Rhine-Westphalia.[32] In the study, the researchers measure acceptance as the likelihood of participation in the scheme and participation intensity as the number of hectares enrolled. Acceptance is determined by studying norms, including the perception of other farmers' behaviour, as well as the perception of how other farmers approve of certain behaviours concerning scheme acceptance and the extent of participation. The results indicate that 60% of respondents are willing to join the hypothetical results-based scheme, with an average commitment of 21% of using their land (areas based). Participation intensity is influenced by social factors, particularly injunctive norms and group signalling, which are linked to the amount of land enrolled in the scheme. The researchers also asked respondents who were not willing to participate why they were not, and the main reason stated was 'anticipated bureaucracy'.[33]

In another study on environmental management and behaviour, Mills et al. (2016) aimed to identify and understand the distinct influences on farmer decision-making regarding sustainable ecological management practices. [34] The project examined the environmental behaviour of farmers by considering both internal factors and the external context in which they operate. Focusing on what shapes farmers' pro-environmental behaviour, this article examines the motives for farmer engagement, their willingness to adopt, and their ability to adopt. To address this, the authors investigated attitudes towards environmentally friendly farming practices overall. The paper includes various examples from farmers' statements but does not specifically inquire into individual measures.

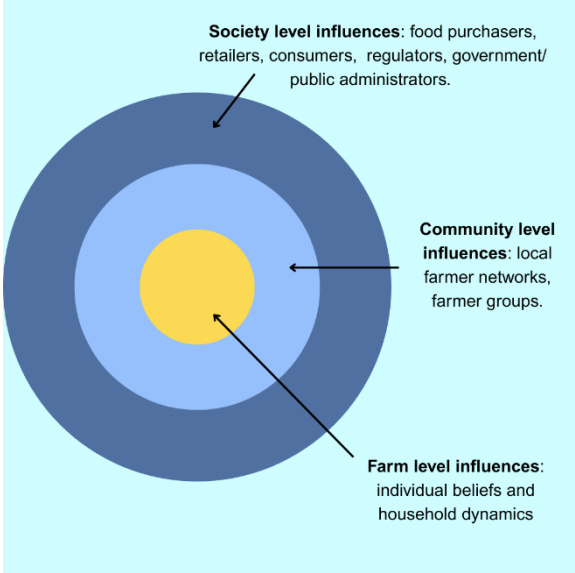

Figure 1: Influence factors of the affecting farmers' willingness to change. Figure adapted from Mills et al., 2016, Page 9

Figure 1 illustrates the three different levels of influence that the author identified are currently in effect. All three, 1) the societal level, e.g. consumers' demands, 2) the community level, e.g. neighbouring farmers' advice, and 3) the farm level, e.g., specific experiences, can influence in parallel and impact the farmers' willingness to change (e.g. a system, a set of measures, etc.). While the study by Mills et al. (2016) does not assess individual measures, the framework itself is suitable for informing our study, as the same three levels are meaningful for nutrient reduction measures.

Regarding the societal level, the authors find that „changing farmers' values and beliefs is easier if they recognise that it is something that society wants and values."[35] and prescribe a clear role to the government to ensure coherent guidance and message to both farmers, as well as citizens, as consumers. Here, it is stated that rather than supporting an output-oriented focus, as has been done strongly since the 1980s, the government must reframe its approach to transmit environmental management and better, more sustainable practices as desirable. [36]

In a study on motivations for farmers' participation in agri-environmental schemes by Podruzsik, S., and Fertő (2024), the authors consider how to support sustainable land management and the preservation of biodiversity. [37] They specifically centred their literature review around the keyword "acceptance" to explore critical dimensions of

[29] Wohllebe, 2024.
[30] Schäfer & Keppler, 2013.
[31] Huijts et al., 2012.
[32] Massfeller et al., 2022.
[33] Massfeller et al., 2022.
[34] Mills, J. et al. (2016).
[35] Mills, J. et al. (2016), Page 12.
[36] Mills, J. et al. (2016), Ingram et al., 2009.
[37] Podruzsik, S. and Fertő, I., 2024.

how AESs are viewed and embraced by farmers, policymakers, and other stakeholders. While terms such as “adoption," “uptake,” and “implementation” often describe the practical aspects of engaging with AES, “acceptance” offers a broader, more conceptual insight into the willingness and readiness of individuals and communities to participate in these schemes.[38] In their research, they highlight that acceptance of AES depends on factors that can be assigned to different categories:

- Ecological and environmental factors (e.g. contribution to biodiversity conservation and ecosystem services, and habitat restoration)
- Economic factors (e.g. Farmers prefer AES that offer clear financial advantages; Economic concerns often outweigh environmental benefits)
- Socio-political factors [e.g. Socio-economic factors (farm size, farmer age, education) influence AES acceptance]

The authors find that AESs are key to the EU’s sustainable agriculture strategy. However, enhancing their effectiveness requires optimising incentives to balance economic feasibility for farmers with environmental objectives while considering diverse social and cultural contexts. Effective monitoring and evaluation frameworks using standardised metrics are essential to assess their ecological and economic impacts consistently. They recommend that future research focus on long-term studies of AES impacts and adopt an integrated approach that combines ecological, economic, and socio-political perspectives to refine policies and ensure their sustainability.

The distinction between the three categories of factors (ecological, economic, and socio-political) proposed by Podruzsik and Fertő (2024) helped us in our study to develop a methodology for the interviews and survey, confirming which factors to investigate to assess social acceptance.

Another angle of social acceptance is the level of exchange amongst peers (farmers) on the implementation of measures, as this is proven to generate the most trust.[39] A study by van de Brink et al. (2021) on the impact of voluntary measures in agricultural practices on groundwater in the Netherlands reveals that farmers who engage in discussions with fellow farmers and attend events where they can learn from and with each other increase their trust and the implementation of measures, regardless of whether these measures are voluntary or binding. Through personalised advice and joint interpretation of the Annual Nutrient Cycling Assessment (ANCA), farmers developed a clearer understanding of how specific measures help reduce water pollution, making them more likely to adopt those measures. Providing farmers with individual advice enhances their trust in proposed measures—such as selecting less harmful pesticides or postponing application times—though it is more costly than offering guidance in group settings. Another important finding is that, while the study showed that many farmers are willing to join on a voluntary basis, they still requested financial compensation in the long run, because they believe it is fairer. [40]

A fourth study on environmental stewardship in farming practices in Germany (2024) reflects on utilising the CAP effectively on an operational level to enhance biodiversity. The project finds that the main issues farmers highlighted were insufficient remuneration for the measures, a lack of flexibility, and a perceived high risk of sanctions. [41] In a policy brief of this project, the reasons are coined as the usual suspects (,,Alte Bekannte’’), as qualitative studies with farmers show that a reduction of bureaucratic hurdles and a consideration of underlying economic mechanisms must go hand in hand with the consideration of social and cultural components in the design of nature and environmental protection measures. [42]

Overall, measuring social acceptance of nutrient reduction measures is crucial because even sound policies can fail without the support of the public and stakeholders. All four studies presented above examined the farmers' perspective, but not that of the citizens. Gaining insights from farmers and citizens is essential for understanding why specific measures are more popular and widely adopted than others. This is why we also include citizens in our report. Looking forward, it will also be helpful for the continuation, expansion, or introduction of new measures to gain a better understanding of the level of public support required to protect the Wadden Sea. Understanding acceptance also helps identify economic, social, and institutional barriers that hinder implementation. Ultimately, integrating social dimensions ensures that nutrient reduction efforts are effective, sustainable, and supported by those they impact. To collect data for this process, we adopted the methodology described in the following chapter.

[38] Podruzsik, S. and Fertő, I., 2024.
[39] Heidenreich, Klodt & Gärtner, 2023.
[40] van de Brink et al., 2021.
[41] CAP4GI, 2024.
[42] CAP4GI, 2024.

1.4. Contributions and objectives of this deliverable

For the NAPSEA project, we study social acceptance of measures for reducing nutrient inputs into the Wadden Sea to investigate why specific measures are not implemented, even if they are required in the policy framework or subsidised as a part of voluntary schemes. The data (interviews with farmers and surveys with citizens) are deemed important to gain the best insight into the perspective of the two groups, which is often not considered when defining nutrient reduction measures in legal acts. Several common nutrient reduction measures, identified in deliverable 2.2 of the project ("Report on the feasibility of measures to reduce nutrient inputs in the Elbe and Rhine"), were explicitly asked about in the citizen survey and farmers' interview. By capturing their viewpoints, we derive the level of social acceptance on the selected measures and make proposals on how to support the implementation of measures best.

While it focuses on the social acceptance of nutrient reduction measures, it also integrates some learnings of the governance work of the NAPSEA project (Deliverable 2.3: "Recommendation on improved coherence for current nutrient reduction strategies") into the recommendations. The policy coherence, as suggested in D2.3, would potentially help increase social acceptance of measures, as the policy becomes more robust and consistent, and therefore less confusing for farmers/or requiring less administrative work.

Unlike previous researchers' work, our study focuses on the geographical areas of the two main rivers, the Rhine and Elbe, which discharge into the Wadden Sea, with the Rhine River basin serving as the case study for this study. Therefore, the niche we are trying to fill concerns efforts in agricultural practices along the Rhine River basin, specifically at the measure level, to better understand how farmers can contribute to reducing nutrients and thereby protect the Wadden Sea.

The aim of the surveys and interviews is to deliver input to the following questions:

- What is the social acceptance level of the measures presented to the farmers and the citizens?
- What are the barriers to implementing the measures that keep the farmers from implementing them? (higher costs/ administrative work/ lack of evidence of effectiveness/ maintenance work, etc.)
- Which factors can support the implementation of these measures?

2. Methodology

This report analyses social acceptance of nutrient reduction measures in agricultural practices by citizens and farmers. The study focuses on attitudes and values[43] to better understand how measures are perceived and accepted, [44] but we also include the motivation (of the farmers) in our concept. Attitudes are learned tendencies to respond positively or negatively toward people, objects, or situations, while values are deeply held beliefs about what is important and worthwhile. Together, they shape motivation by influencing what goals people pursue and how much effort they put into achieving them. This helps explain why some measures are more popular among farmers and the citizens. By examining farmers' motivations, we can also determine whether measures are adopted out of personal conviction or due to external pressure and whether this distinction influences implementation. It should be noted that the link between attitudes and behaviour is not necessarily direct, as it is also influenced by other factors such as capacities.[45] Another possible dynamic that is hard to eliminate is when a behaviour is performed due to external or social pressure, rather than because of an intrinsic belief or behaviour.

The research combines qualitative and quantitative methods and was conducted between November 2024 and March 2025 in Germany and the Netherlands. This chapter provides an overview of the Methodology, as summarised in Figure 2. For the full methodology, please refer to Annex I.

[43] 'Actions' is not considered thoroughly as a variable, because the surveys and interviews only yield information the citizens and farmers provide, respectively. There was no possibility in the scope of the project to also measure actual actions such as changes in purchasing behaviour or so.
[44] There was no possibility in the scope of the project to measure actions.
[45] Grelle and Hoffmann, 2024.

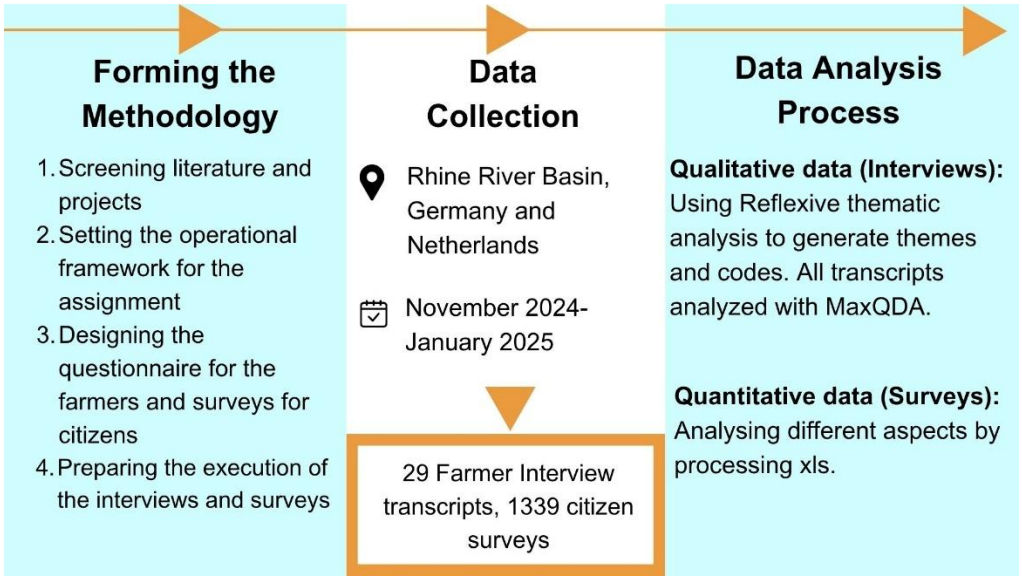

Figure 2: Methodological overview

Methodological design and preparation

The methodological framework was developed through a multi-step process. A literature and project review was conducted to identify existing research and practices related to social acceptance and environmental protection, particularly in the context of nutrient reduction. The literature review informed both the theoretical framework and the design of the data collection methods. Please refer to Annex 1 for the full Methodology, as this chapter provides an overview only.

The operational scope was defined to focus on the Rhine catchment area. Data were gathered using two primary tools: interviews with farmers and surveys with citizens. Two data collection instruments were designed: an open-ended question interview guide for farmers and a structured survey for the citizens. These were developed in iterative consultation loops within the project team to ensure precision and contextual relevance. After creating the interview guide and survey in German, both instruments were translated into Dutch and pilot-tested to ensure comprehension and cultural appropriateness.

In the citizens' survey, we specifically asked their opinion about three common measures (managing nutrients more strictly in farming activities by employing them less frequently, reducing the livestock and increasing the planting (and potentially the width) of buffer strips), which were identified as effective measures in deliverable 2.2.[46] In the farmer's interview, we did not mention a prescribed set of measures, but encouraged farmers to say what kind of measures they implement freely.

Data collection

Farmer interviews:

In Germany, 20 farmers were interviewed via phone by trained staff. Each interview lasted approximately one hour and followed a semi-structured format to ensure coverage of key themes: knowledge, meaning, expectations, and behaviour concerning nutrient reduction. The German interviews were fully transcribed. In the Netherlands, NMI staff conducted nine in-person interviews at farmers' homes, typically lasting 45 minutes, using the same semi-structured format. Notes were taken in real time, ensuring a relaxed and open atmosphere. The difference in the number of interviews in the countries occurred due to capacity limits of the Dutch interviewers and difficulties reaching representative farms. This may slightly impact the results, as there are 20 interviews in Germany and only 9 in the Netherlands (see Figures 3 and 4).

Although we acknowledge the difference in the recording method and number of interviewees between countries, it should not be critical, as the focus of the research is not on the differences between the two countries, but instead on the cumulative social acceptance aspects.

[46] NAPSEA, Deliverable D.2.2, 2023

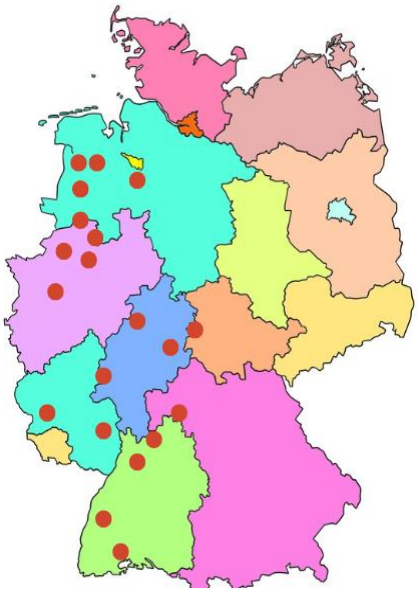

Figure 3. Interview locations in Germany

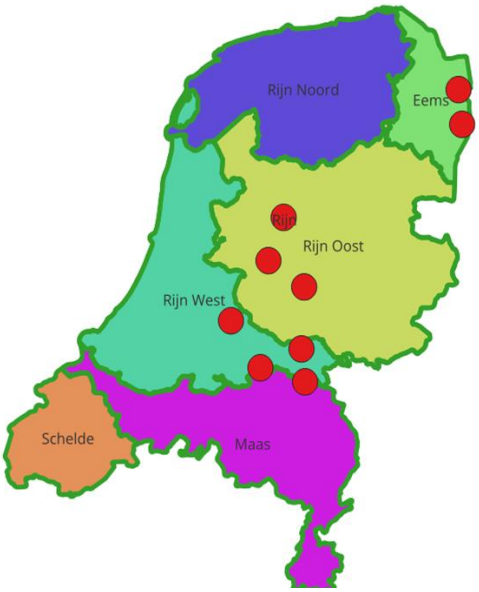

Figure 4: Interview locations in the Netherlands

Citizen surveys:

A mixed-mode survey (partially distributed online and partially conducted as phone interviews) in Germany yielded 1,032 responses. The sample included residents aged 18 and older in the Rhine catchment area. All questions were multiple-choice (see Annex III). In the Netherlands, 307 respondents participated in an online survey targeted at adults within defined Rhine subregions (Rijn West, Rijn Oost, Rijn Noord).

In Germany, the distribution between online and phone surveys was as follows:

- N=491 population sample from the phone survey
- N=541 population sample from the online survey

To ensure a survey length that respondents feel comfortable with, it was decided that one question from the phone survey was altered: In each phone survey, respondents were asked about one measure instead of three measures (Block: Experience). Therefore, the German data sample is:

- N= 1032 (=541+491) for all other questions of the survey (combining telephone and online survey results)
- N= 705 (=541+164) per measure for the question block on specific measures (combining telephone and online survey results)

In the Netherlands, only an online survey was conducted. The online respondents amounted to a dataset of N=307 panellists (online survey).

Data storage

All datasets were anonymised and stored in standardised formats: interview transcripts, general participant information, and survey results (both qualitative and quantitative).

Data analysis

Qualitative analysis:

Interview data were analysed using reflexive thematic analysis with inductive coding.[47] Coding qualitative data ensures a more systematic and rigorous data analysis, as it accurately represents participants' inputs, increases the validity of the results, and decreases bias.[48]

The following steps were followed:

1. The farmer interview transcripts were reviewed to identify trends and common topics across the various categories.
2. Reflexive thematic analysis[49] was chosen as the technique most suitable for the analysis because it allows for inductive coding along the process, where all interesting aspects from the interviews will be reflected in the analysis. We benefit from the iterative approach by frequently revisiting the data, gaining a deeper understanding of it from different perspectives each time.

Quantitative analysis:

The data, including socio-demographic information, were cleaned and harmonised to account for differences in questionnaire design and coding between the two countries. Survey data were analysed by categorising responses under four thematic lenses: knowledge, meaning, expectations, and behaviour.

Data on social acceptance was captured in interviews and surveys with stakeholders, asking them about:

- **Knowledge:** The state of knowledge and assessment of citizens regarding nutrient pollution, its extent, sources, and the degree to which survey participants believe nutrients from rivers pollute the Wadden Sea. This helps us understand the familiarity with the topic among study participants.
- **Meaning:** An assessment of the effects of nutrient pollution and its impact on the public perception.[50]
- **Expectations:** To understand public acceptance, an assessment of three measures (usage of fertilisers, livestock density, and width of buffer strips) based on citizens' responses related to the sufficiency of each measure and the expected impacts. An indirect question on willingness to change consumption patterns is also required.
- **Behaviour:** An assessment of proposed changes between the political framework of the farmers' operations and the citizens' perspective. Additionally, responses regarding willingness to reduce dairy and meat consumption are a survey item for checking expectations.

These categories were selected to categorise the survey and interviews, collecting data that gives rise to the social acceptance areas of attitudes, values, and motivation (adapted from Schäfer & Keppler, 2013), to build an appropriate social acceptance theory for our study context. Socio-demographic factors were cross-tabulated to explore variation in social acceptance. Survey responses were visualised through tables and charts, with some items re-clustered to enhance interpretability.

Data were primarily analysed using descriptive statistics, including averages, frequencies, and percentages, calculated separately for each country and jointly. Missing or non-significant responses (e.g. "I don't know") were excluded. Simple correlations between variables and socio-demographic factors such as age, income, education, and distance to the Wadden Sea were also examined, alongside aggregated indicators. For example, the "effel" index captured ecological lifestyle efforts, while the "measure indicator" summarised views on proposed measures.

Visualisations were mainly produced in Excel, with some spatial analyses using SQL, Python, and GIS. The results are presented in charts and tables, with a focus on the most significant findings. Aggregations and groupings were tested for robustness to ensure clarity and avoid unnecessary complexity.

Because we wanted to know the proportions of citizens who agree to specific measures, and what impacts they anticipate if measures were stricter, the primary data was processed in various tables. Different data trends were plotted to describe the current state of the data and identify possible trends based on the self-assessment and statements of the citizens.

[47] Braun et al., 2022.
[48] Coding also provides transparency and reflexivity for the active researcher and anyone using the research, source (Delvetool, 2025).
[49] Maguire& Delahunt, 1970.
[50] In their study „Public perception and acceptance of nutrient supply from factories and sewage treatment plants to mitigate coastal oligotrophication: A case study in Japan" Uehara and Hidaka (2023) take a similar approach by collecting data linked 1) familiarity, 2) public perception and 3) public acceptance.

3. Study Results

This chapter presents the study's findings in five sub-chapters. The first chapter presents the social demographics of the study participants. In contrast, the second sub-chapter examines how citizens and farmers perceive current measures, evaluating their adequacy, exploring expectations around stricter alternatives, and concluding with an analysis. The third sub-chapter shares the consideration of farmers on nutrient reduction, and the fourth sub-chapter identifies the key environmental, economic, socio-political, and legal-administrative factors that either challenge or enable the implementation of these measures. The fifth sub-chapter presents what citizens are willing to change for nutrient reduction.

3.1. Social demographics and thematic awareness of the study participants

This sub-chapter outlines the socio-political characteristics and topical knowledge of the study participants. Understanding these attributes is essential for interpreting their perspectives and responses within the broader analytical framework. The section includes demographic data, political orientations, and participants' prior familiarity with the study topic. By situating participants within their social and knowledge contexts, the study ensures a more nuanced understanding of the findings.

3.1.1. Citizen survey participants' social demographics

The total number of respondents from the citizen survey was 1023 in Germany and 304 in the Netherlands, this is the amount of responses that was gathered out of 7154 contacted in Germany and 1332 for the Netherlands. The average age of respondents was 50.3 years. The gender ratio of the respondents is 47% male and 53% female in Germany. In the Netherlands, the population is comprised of 51% males and 49% females.

There are no significant differences between the respondents in the two countries regarding household size. Overall, 23% live in single households, close to 40% of the respondents live in 2-person households, 16% live in a 3-person household, 14% live in a 4-person household, and 7% live in a 5-person household.

The educational backgrounds of the survey participants differ between the two countries; however, a direct comparison is not possible due to the differences in their education systems. In the survey sample, 32% of respondents in the Netherlands completed general education with 9 years of general education, while in Germany, 7% have completed general education. Among German respondents, almost two-thirds (61%), while in the Netherlands, only 18% of the respondents earned a general qualification for university.

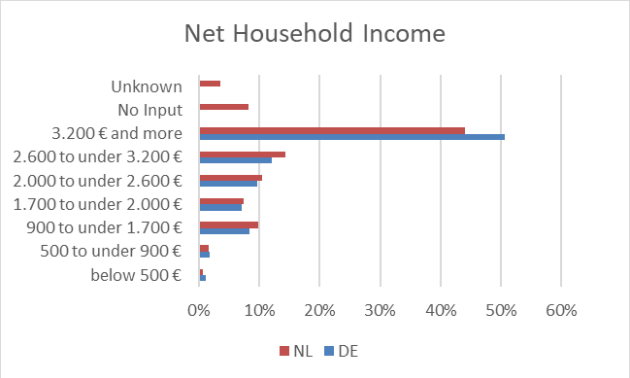

Figure 5: Overview of net household income of the survey participants

In Figure 5, the distribution of the net monthly income for the respondents' households can be seen. It is visible that more than 51% of the respondents have a net household income of more than 3200 €. The net income for other respondents can be grouped into six groups: around 13% net income is between 2600 and 3200 €; 9% between 2000 and 2600 €; 7% between 1700 and 2000€; 9% between 900 and 1700€; around 3% between 500 and 900€; and 2% below 500€.

3.1.2. Interview participants' social demographics

The farmers interviewed work in a broad range of agricultural sectors. 9 out of 29 farmers are engaged in arable farming, often combined with direct marketing, grassland use, or forest management. Meat production of pork and poultry (6 farmers), feed production (6 farmers), and dairy farming (6 farmers) are also prominently featured. Most farmers who were interviewed do more than one farming activity. A few also diversify their operations into nature conservation, landscape maintenance, distillation, and orchard management.

Regarding farming practices, most farms operate conventionally, although a few are certified organic or employ a combination of organic and conventional methods. One farmer described their approach as "close to nature," reflecting a commitment to environmentally conscious practices without formal certification. The age of the

farmers ranges from 36 to 72, with an average around the early 50s, suggesting a relatively experienced group. Their professional qualifications are diverse, including formal agricultural education such as agricultural technicians, state-certified farmers, and agricultural engineers, as well as backgrounds in trades and unrelated fields like carpentry, automotive mechanics, and business administration. This variation in training indicates a mix of traditional agricultural training and broader vocational experience. The operational structure of the farms also varies. Most are family-run, but several are organised as limited liability companies, cooperatives, or other corporate forms, showing a blend of small-scale and more structured, larger, commercial operations.

3.1.3. How aware are the study participants of the subject?

To better understand the background of social acceptance, we include information on farmers' and citizens' perceptions of the effects of agricultural activities on natural ecosystems, as we sought to understand the state of knowledge regarding the effects and spread of nutrients into waterways.

As part of the interview, as a warm-up question, farmers were asked how actively they follow discussions on nutrient reduction. The responses vary in how regularly and intensively the farmers follow the discussion (e.g., whether they actively search for information) and through which channels (research papers, farming groups, word of mouth, popular media) they gather information.

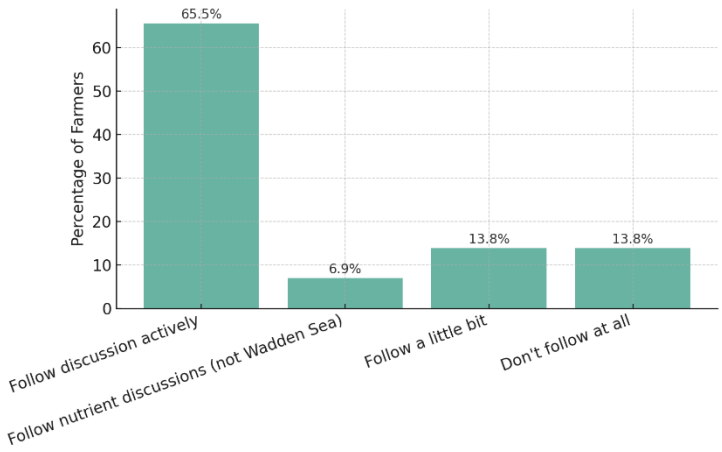

Figure 6: Farmers Engagement in the Nutrient Discussion

Figure 6 illustrates the extent to which farmers follow public discussions related to nutrient management. A clear majority (65.5%) of respondent's report that they follow these discussions actively, indicating strong engagement with the topic. A smaller portion (6.9%) follows discussions on nutrient issues in general, but not those specifically related to the Wadden Sea. Meanwhile, 13.8% of farmers say they follow the discussions only a little bit, and another 13.8% do not follow them at all. These results suggest that while most farmers are well-informed and engaged, a notable minority remains less involved in ongoing public debates.

The ones that state that they follow the discussion closely add that they do so to be up-to-date and/ or stressed, that they feel they have to, because the nutrient levels directly impact their farming strategies, but also to understand what the agricultural sector contributes to the problem, and what inputs come from other sectors. As one farmer states: „ So agriculture has always tried to preserve nature because that is what we live from." Three of the farmers who said they are actively interested in the discussion differentiate between being informed about everything that's happening and participating in the discussions. Two farmers in a red zone[51] mentioned that they care more due to their location and specific conditions.

[51] A red zone (rote Gebiete) refers to areas designated under the Fertiliser Ordinance (Düngeverordnung) where nitrate pollution in groundwater exceeds the EU limit of 50 mg/l, triggering stricter rules on fertiliser use to protect water quality. BLE – Bundesanstalt für Landwirtschaft und Ernährung, 2023.

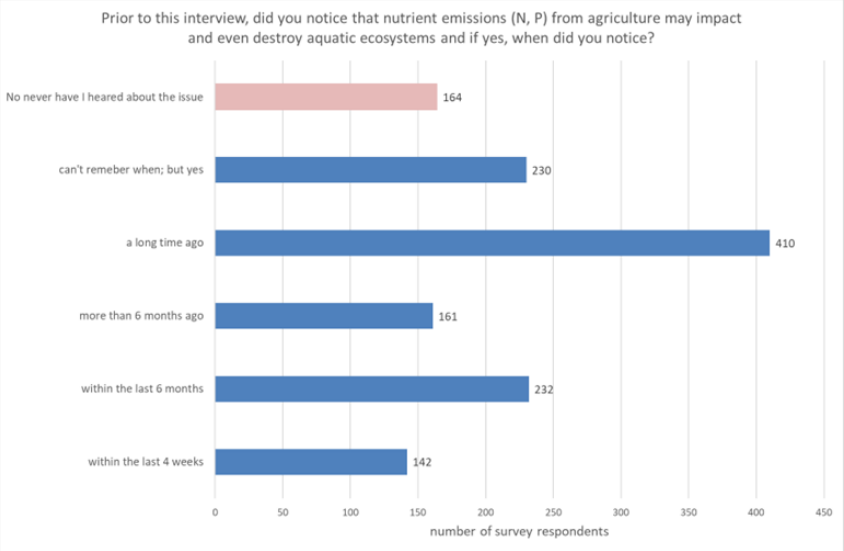

Figure 7: Citizens Engagement in the Nutrient Discussion

At the same time citizens' knowledge and awareness are relatively homogeneous across both countries. Figure 7 illustrates respondents' awareness of agricultural nutrient emissions (nitrogen and phosphorus) and their impact on aquatic ecosystems before filling in the survey. Most respondents (410) reported noticing the issue "a long time ago." A significant number also recalled noticing it either "within the last 6 months" (232) or could not remember when but confirmed awareness (230). Fewer respondents noticed the issue "within the last 4 weeks" (142) or "more than 6 months ago" (161). Notably, 164 respondents indicated they had never heard about the issue before the survey.

Negative effects on natural ecosystems: farmers perspective

In order to estimate the problem understanding among farmers, the following question has been asked: ,,In your opinion, what responsibility do farmers have for the protection of our waterways?'' and ,,What negative effects do you acknowledge for the immediate ecosystems (such as streams and rivers in the area)?''

In their responses farmers generally recognized that their activities influence the state of nature, even if agriculture is not seen as the sole driver of environmental degradation. Several interviewees stressed that those managing land have an inherent duty to preserve it, not only for their own livelihoods but for future generations. Farming was described as intrinsically tied to nature's health, with good practice aiming to maintain soil fertility and ecological balance. Industrialized forms of production, in contrast, were seen as too far away from "real" farming and a potential source of harm. As one farmer explained: "A farmer doesn't think in short timeframes, we think in generations – we won't destroy our soil and say 'after me, the flood.' We live from it." While most participants expressed confidence in their management, they acknowledged that "black sheep" exist in the sector, underlining the need for rules and oversight.

Regarding rivers, farmers largely accepted that their sector carries significant responsibility due to its extensive land use in catchment areas. Many viewed agriculture as "number one" in terms of potential nutrient inputs, but also highlighted improvements over the past two decades through regulation, technological change, and increased awareness. Several noted that visible damage, such as fish kills or algal blooms, was rare in their regions, leading them to focus more on preventing substances from leaving their fields than on downstream ecological outcomes. Awareness of connections to distant ecosystems like the Wadden Sea varied, with some perceiving the link as weak compared to other nutrient sources such as wastewater. Others emphasized the importance of continuous improvement, stating that attitudes within farming had shifted markedly toward environmental care. One participant reflected: "Fifteen years ago, people laughed if you talked about reducing inputs – now it's a point of pride to be more sustainable." Across perspectives, there was agreement that lawful, well-managed agriculture should not significantly pollute rivers, though cases of poor practice still occur.

As the framing in the interview questions emphasized that more sustainable farming practices, especially organic farming would be useful, there were various comments on the concept of organic farming related to the nature protection. Some farmers mention that not all organic farming is the same and that there are varying standards within organic agriculture, along with different ideas about what qualifies as environmentally friendly farming and what practices are most effective for reducing nutrient levels.

To see if farmers that are aware and try to minimize the negative effects of nutrient input into their local rivers and streams, but also consider the effects on the Wadden Sea, the interviews asked the following question: What negative effects they acknowledge for the immediate ecosystems (such as streams and rivers in the area). Furthermore, there was a follow-up question on how much they think about effects further downstream, for the Wadden Sea.

The answers show that according to German farmers farming effects to the state of Wadden Sea are not closely interlinked. The following comment is capturing the majority of the farmers assessment „ So, the Wadden Sea, in that sense, is very far away from us. It's not the first thing we see. Of course, we see our surroundings here, and even though the water eventually drains away, we're almost more concerned about our groundwater, for example, nitrate levels and the like, or the eutrophication of our waters here.“ This shows that there is some awareness, but the effects, and therefore their own activities' impact to the Wadden Sea remain ambivalent.

The comments also show that farmers are aware of the connectivity and effects of the nutrients in the river, but the Wadden Sea is not the first thing that comes to mind when applying nutrient reduction measures. From a ''small'' connection to a ''clear'' connection to a ''complex'' connection, there are various ways that the connection between farming activities and the nutrient load in the Wadden Sea is described. Only one farmer comments on a clear connection: „Yes, I mean the Rhine also arrives somewhere, sooner or later, so of course you follow it.“

Negative effects on natural ecosystems: citizens' perspective

Amongst the citizens, overall, 27% of respondents from both countries consider their environment heavily polluted, with 28% in Germany and 23% in the Netherlands. Moderate pollution levels are reported by 38% overall, with slightly more in Germany (39%) than in the Netherlands (33%). Only 23% of all respondents believe pollution is within acceptable limits, with Germany at 25% and the Netherlands at 18%. A small percentage, 5% overall, say pollution is below thresholds, with 5% in Germany and 6% in the Netherlands. Interestingly, 8% of respondents did not know or did not answer, including just 4% in Germany but a notable 21% in the Netherlands. In the survey results, a question on the impact of nutrients on the ecosystem is posed to the citizens to understand when (at all) they are aware of the issue. Of course, this is not yet a strong indicator of their level of active awareness, but it shows if people are aware of the problem in the first place before filling in this survey.

From the citizens perspective, the survey aimed to capture their assessment of potential negative effects for the Wadden Sea as well.

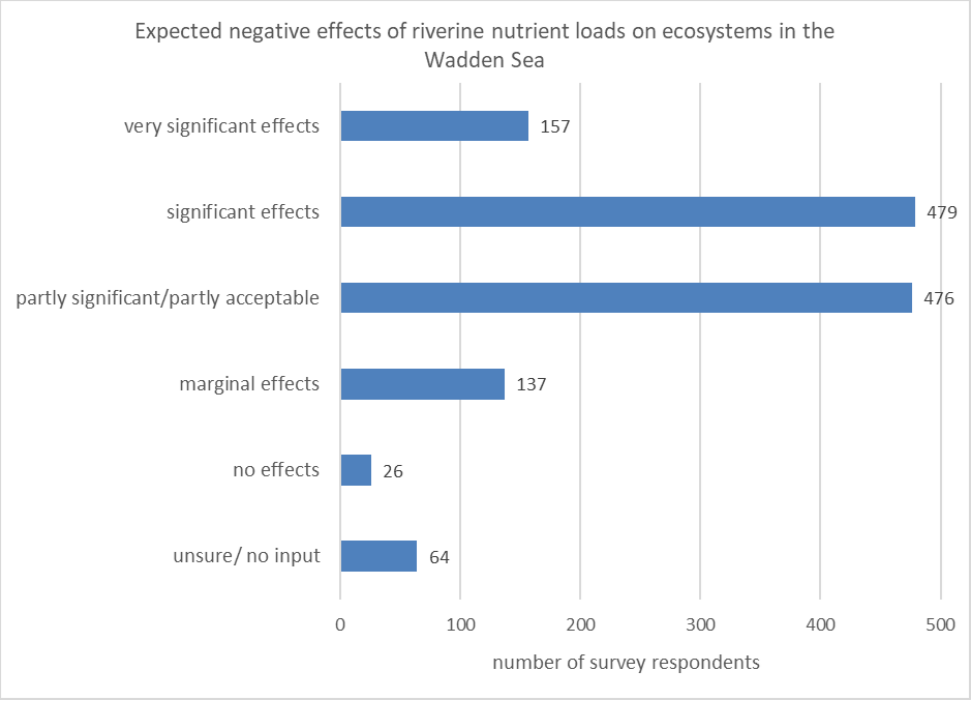

Figure 8: Citizens' views on the expected negative effects of riverine nutrient loads in the Wadden Sea

Figure 8 illustrates respondents' views on the expected negative effects of riverine nutrient loads on ecosystems in the Wadden Sea, based on a survey of 1,339 individuals. The majority of participants anticipate serious consequences: 479 respondents believe the effects will be “significant,” and a nearly equal number, 476, consider them “partly significant/partly acceptable.” Additionally, 157 respondents expect “very significant

effects," highlighting a widespread concern about the ecological impact. In contrast, only 137 respondents predict "marginal effects," while just 26 believe there will be "no effects" at all. A further 64 participants were unsure or did not provide input. These results suggest a strong consensus among respondents that nutrient pollution poses a notable risk to the Wadden Sea ecosystem.

Comparing the results from the farmer interviews with the citizens survey, it seems that the general public is more aware of the effects of farming on the Wadden Sea than the farmers themselves.

3.1.4. Who feels affected by high nutrient concentrations?

When evaluating social acceptance, which geographical areas and groups are affected is essential because people usually engage more with the things they care about.[52] Therefore, a question was included examining which groups of people (i.e. future generations, the respondents themselves personally, people living at the Wadden sea) are negatively affected by excessive nutrient levels, particularly when measures to reduce these nutrients are inadequately implemented. Additionally, it was also asked if they think the economy in general is affected by excessive nutrient levels.

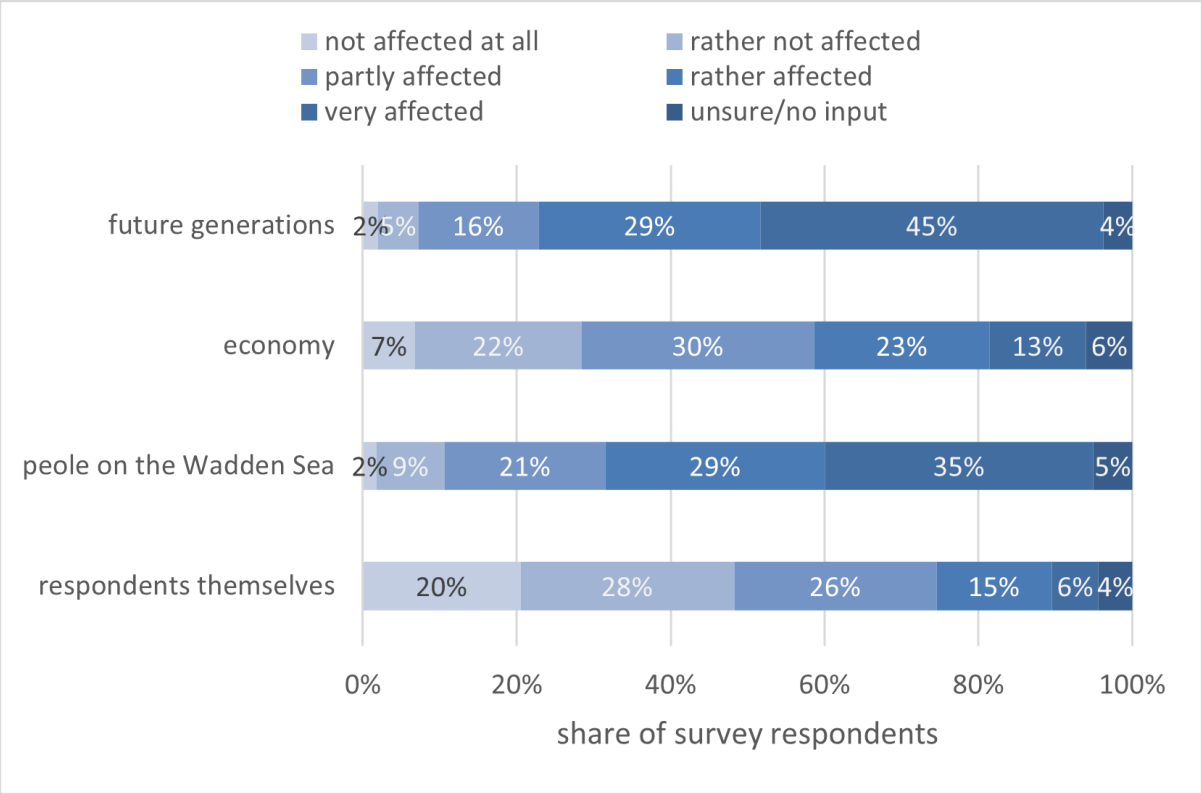

Figure 9: Assessment of who is affected by the citizens

Figure 9 illustrates how survey respondents perceive the impacts of eutrophication across different groups (across Germany and the Netherlands). A significant majority—approximately 75%—believe that future generations will be either "very" or "rather" affected. ." Similarly, 64% of respondents think that people living directly along the Wadden Sea will face substantial consequences, with 35% indicating "very affected" and 29% "partly affected." For both the economy and personal lives, the perceived impact is somewhat lower but still notable, with 53% to 54% of respondents indicating these areas will be at least "rather" or "very" affected. Only around a quarter believe that these sectors will not be affected at all or are "rather not affected."

However, the results reveal marked differences between respondents in Germany and the Netherlands. German participants were significantly more likely to say that future generations will be "very affected" (49%) compared to Dutch respondents (29%). When combining the "rather" and "very affected" responses, this difference remains pronounced—78% in Germany versus 58% in the Netherlands. Similarly, 67% of German respondents believe that people along the Wadden Sea will be either "rather" or "very" affected, compared to only 49% in the Netherlands. In general, Dutch respondents were more ambivalent, with 8% to 13% more selecting intermediate

[52] Clayton et al., 2015.

or unsure responses across all categories, including personal impact, the economy, future generations, and people on the Wadden Sea. This highlights an international divide not only in the intensity of concern but also in the clarity of perception regarding the effects of eutrophication.

Apart from who feels affected, we also wanted to find out how and to what extent:

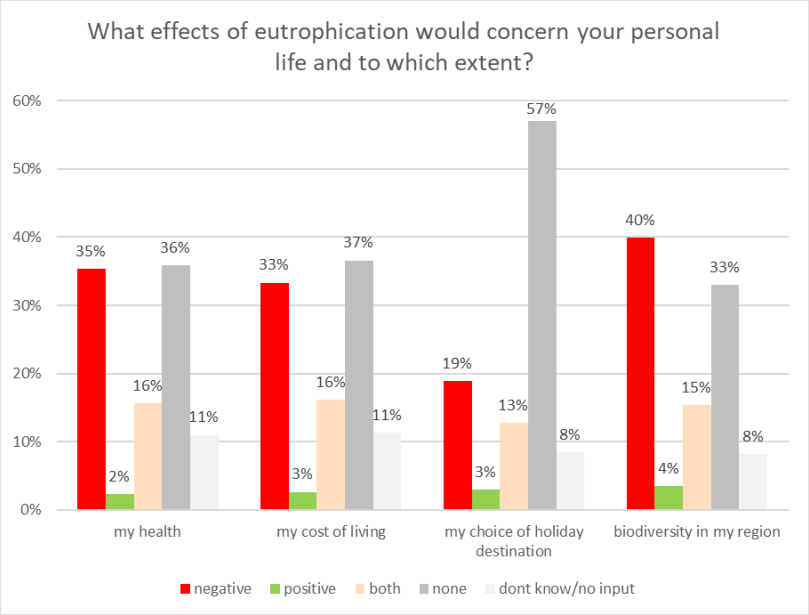

Figure 10: Citizens' assessment as to how eutrophication would affect their personal life

Figure 10 titled *"What effects of eutrophication would concern your personal life and to which extent?"* presents survey responses on how different aspects of people's lives might be affected by eutrophication (across Germany and the Netherlands). It includes four categories: biodiversity in one's region, choice of holiday destination, cost of living, and health. For each category, respondents indicated whether they expected the impact to be negative, positive, both, none, or whether they didn't know or provided no input.

Across the different options, a significant proportion of respondents indicated that they expect no effect on any of the areas of their personal life. This is followed by the option 'both'- positive and negative effects on the different concerns (beige), or, while negative impacts (red) were still substantial. Concerns about biodiversity and health showed the highest share of negative effects assessment, each nearing 40%, while the choice of holiday destination has a somewhat lower negative share. Next, the option 'No opinion/no input' (grey) and positive effects (green) were minimal in all categories, and a small proportion. Overall, the majority of people do not expect any effects at all. Also, the results indicate that perceived negative effects of eutrophication are most strongly linked to biodiversity loss and potential health risks, while other impacts are less widely recognised.

3.1.5. Responsible actors

To explore what kind of changes could enable the implementation of nutrient reduction measures, it was examined how citizens and farmers perceive responsibility—both in terms of who is seen as causing nutrient pollution and who should take action to reduce it, including how these roles are interconnected. Additionally, people's willingness to change varies in degree and form. Through our citizen survey, we gathered self-reported insights on what individuals have already changed and what they would be willing to change in the future to support more environmentally friendly consumption.

We collected information on what farmers believe are other important actors responsible for high nutrient loads in rivers, and these questions sparked the most elaborate replies. Apart from which other actors the farmers mentioned, a strong theme that arose was the perception of farmers that agriculture is seen too strongly as the culprit and other actors should also seriously reduce their nutrients. The responses reflect a broad attribution of responsibility for nutrient-intensive pollution beyond agriculture, with several recurring themes.

65% of farmers in our interviews recognise the importance of water protection but are critical of current approaches. An arable farmer emphasises that regenerative agriculture has the potential to solve both ecological and economic problems. Others, such as a dairy farmer, are less concerned about all the tasks ahead in the rural area and trust that things will work out.

From the farmers' perspective, while some acknowledged that farming, especially livestock manure use, plays a role in nitrate contamination, they argued that modern practices have improved and pointed to past decades as worse. There was an emphasis on differentiating responsible and irresponsible farming, suggesting that problems arise from non-compliance or negligence, not standard practices. Many farmers felt unfairly targeted despite making personal sacrifices and investments to reduce nutrient emissions.

While some farmers acknowledge their sector's role, especially in nitrate emissions, most highlight multiple external contributors. The key categories and frequently mentioned causes are:

Industry: Many farmers point to industrial activities, huge factories and specific sectors like potash (Kali) production as significant contributors to nutrient emissions, notably due to salinization and improper wastewater disposal. Chemical accidents and general industrial wastewater were also mentioned as under-regulated sources of pollution. Biogas plants were criticized for causing localized over-fertilization due to limited land area for digestate spreading.

Wastewater Infrastructure and Municipalities: Urban wastewater systems, specifically old and leaky sewage infrastructure, were repeatedly cited as major, yet often overlooked, sources of nutrient input. Farmers emphasized the diffuse leakage from ageing pipes, especially under cities, and the lack of public discussion or political will to address it. Sewage treatment plants were seen as frequently overwhelmed (e.g. during heavy rainfall), with many still using combined sewer systems that fail to separate stormwater from sewage, leading to overflow and nutrient discharge. There is concern that municipalities shift blame to farmers while neglecting their infrastructural responsibilities.

Private Households and the General Population: Domestic contributions via phosphates in detergents and cleaning agents were cited multiple times, especially concerning phosphorus levels. Lawn fertilization and misuse of garden fertilisers by individuals were viewed as underappreciated sources. Some emphasized that the entire population contributes through everyday practices that affect water quality.

Government and Policy: Several respondents criticized state policies for being inconsistent or enabling problematic developments (e.g., approving large biogas plants) on the national level. Some saw the state and municipalities as partly responsible, as regulators and polluters, calling for more introspection before blaming agriculture. A lack of supportive, rational agricultural policy and the dominance of punitive regulation were also criticized. Several comments were directed against the EU nitrates directive and the Common Agricultural Policy (CAP). Overall, the EU and the national level was criticized, while the state-level laws and implementation processes were not mentioned.

Public Perception and Media: The media and education system contributed to a negative bias against agriculture, especially in how topics like monocultures are presented in schools.

In summary, while farmers recognize that agriculture contributes to nutrient pollution, they overwhelmingly believe that industry, municipal infrastructure, and private households also play significant roles — often underacknowledged. They call for a more balanced assessment and shared responsibility across all sectors.

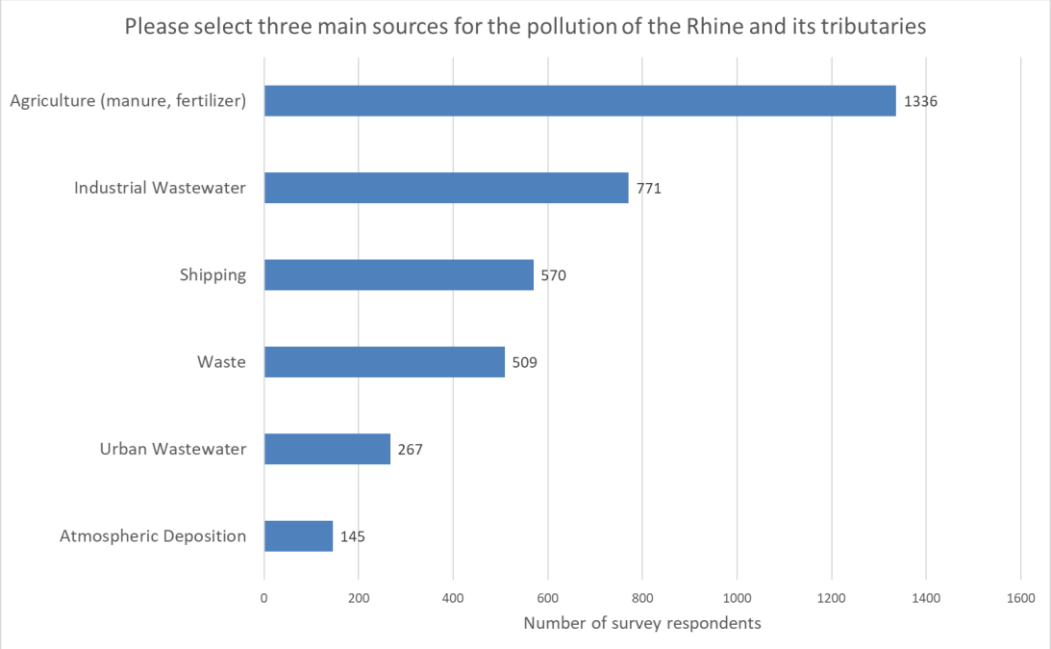

Figure 11: Current state of knowledge on nutrients in the aquatic systems of the citizen survey participants

Parallel, the citizens were asked for their assessment of sources of pollution of the Rhine and its tributaries. Please note, that here citizens were asked about pollution in general, not about nutrient pollution specifically. Survey respondents were asked to select three main sources out of eight possible pollution sources: waste of individuals and illegal deposition of significant loads of waste, industrial wastewater, agricultural waste such as liquid manure, fermentation residuals, agriculture (excessive fertilization), agricultural (plant protecting agents such as pesticides, herbicides), urban wastewater, wastewater and oils from shipping, atmospheric deposition (e.g. heavy metals and NH3).

Figure 11 shows the survey respondents identifying the three primary sources of pollution in the Rhine and its tributaries.[53] Agriculture, including manure and fertiliser, was selected most frequently, with 1,336 respondents citing it as a significant source. Industrial wastewater followed with 771 responses, and 570 respondents identified shipping. Waste and urban wastewater were selected by 509 and 267 respondents, respectively. Atmospheric deposition was the least frequently mentioned source, with 145 respondents selecting it. The assessment of the citizens is aligned with the scientific findings that nitrogen clearly comes from agriculture as a strongest source, and it is also very important for P (erosion, runoff, etc.). The Rhine River Basin Management Plan 2021[54] states that agriculture is named as a key driver and pressure of nutrients and most agriculture. This is aligned with the scientific findings of source contributions of nitrate and phosphorus, see figure 12. According to various studies, the primary source of nutrients stems from agriculture, agricultural runoff, followed by municipal wastewater (e.g. discharges from sewage treatment plants contribute to nutrient loads, especially when treatment processes are insufficient to remove nitrogen and phosphorus effectively) and industrial wastewater.

[53] In the following graph the three different agricultural sources were summed as ‚Agriculture'.
It must be emphasized the question 1.1 referred to „pollution", although the topic of the questionnaire and the project is „eutrophication" and sources for „nutrient discharges".
[54] ICPR, 2022.

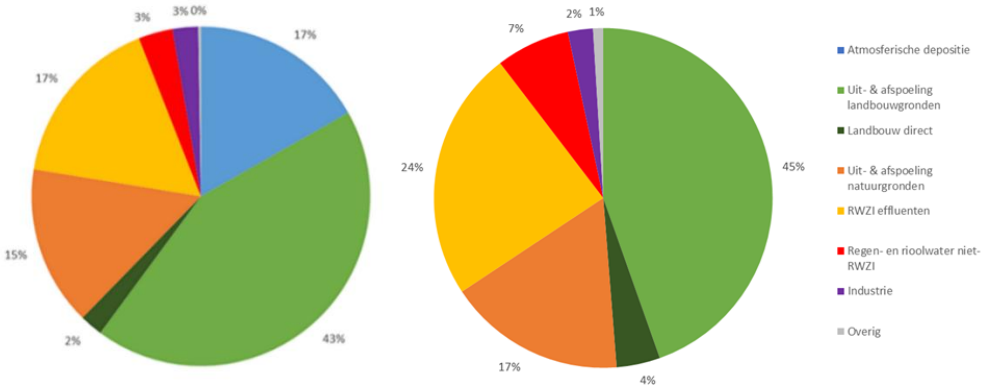

Figure 12: Sources of N (left) and P loads (right) of Dutch surface water. Preliminary figures for the upcoming Nitrate report of the Netherlands (S. Pletten, pers. comm.). Previous figures showed similar distributions (e.g. Fraters et al. 2020), however did not separate natural areas ('natuurgronden') and agricultural areas ('landbouwgronden').

3.1.6. Farmers' perception of citizens' responsibility of nutrient reduction

A recurring theme in farmer interviews is a strong sense of frustration regarding citizens' lack of understanding and appreciation for the efforts and contributions of the farming sector. Many farmers feel undervalued, particularly as consumers seem focused primarily on low prices rather than sustainable or ethical production methods. This sentiment is reinforced by what farmers perceive as a growing disconnect between urban populations and agricultural realities. While public discourse and surveys often express strong normative support for environmentally friendly, animal-welfare-oriented, and regional farming, these values rarely translate into actual consumer behaviour. Farmers frequently mention the gap between citizens' stated principles and their actions at the supermarket—summarized by the phrase, "morality ends at the supermarket shelf." The decline in demand for organic products following the initial rise during the COVID-19 pandemic is often cited as a clear example of this inconsistency.

This dissonance is not merely viewed as disappointing but also as a serious economic threat. Farmers observe that their products are increasingly judged solely by price rather than by their societal, environmental, or cultural value. Many point to structural barriers such as the dominance of low-cost retailers, international competition, and the limited availability of distribution channels for regional and organic goods. Farmers feel that their profession—vital for food security, ecosystem services, and rural life—is underappreciated both socially and politically. Some interviewees report declining societal respect and a political and media environment that often paints farming in a negative light. They also highlight that efforts to reconnect with citizens, such as farm open days, may foster some goodwill but have limited impact on broader consumer behaviour. The desire for perfect-looking, cheap food continues to dominate, while the realities of sustainable production remain poorly understood by much of the public.

Despite verbal support for sustainability, farmers emphasise that consumer acceptance remains superficial and fragile. Public endorsement of ecological farming, though visible in opinion polls and community forums, does not reliably translate into sustained purchasing decisions or meaningful political pressure. Farmers believe that the public holds unrealistic expectations, imagining idyllic small-scale farms while remaining largely unaware of the financial pressures, weather risks, market volatility, and long-term investments required in modern agriculture. Even local efforts to implement sustainable practices often encounter indifference or active resistance, suggesting that social support is not deeply rooted. While there is some public awareness of environmental challenges, farmers argue that genuine support requires more than rhetorical approval—it must include willingness to pay fair prices, accept trade-offs, and support policy frameworks that ensure farming remains economically viable. From their perspective, current societal backing is mainly symbolic and unreliable, falling short of what is needed to enable a real ecological transformation in agriculture. This phenomenon has been described in consumer research as the "attitude-behaviour gap"[55], whereby ethical concerns expressed in surveys fail to translate into purchasing decisions. For farmers, this gap is not merely academic but materially consequential, as it determines market access, price stability, and, ultimately, the viability of their farms.

The perception of public support is mixed. Many farmers believe that while there is an understanding of sustainability, support diminishes if it leads to higher food prices. A dairy farmer from Zeewolde notes, "Citizens often want sustainability, but as consumers, they are reluctant when it comes to higher prices for food." The

[55] Vermeir & Verbeke, 2006.

farmers believe that overall, many people care, and they say they care and buy the cheapest products for supermarket activities. Some are because they have to when the money is tight, and others are so that they can spend the money on other things.

3.2. Evaluation of nutrient reduction measures

There are already various measures being implemented that aim to reduce nutrient use or limit the reduction of nutrient runoff in agricultural practices.

3.2.1. Are nutrient reduction measures sufficient?

Table 1: List of measures for nutrient reduction and their social acceptance shows the seven most commonly applied measures to reduce nutrient losses from farming activities in Germany and the Netherlands. Of the seven measures, three measures were explicitly mentioned in the citizens' survey. This table includes the social acceptance of citizens, the bindingness of the respective measures, and the motivations for implementing the measures among farmers.

We interpret this to mean that if a citizen prefers stricter regulations, it implies a high degree of acceptance of the measure. The stricter regulations of fertiliser management and the application of buffer strips were especially popular. 38% of respondents in Germany and 22% per cent of respondents in the Netherlands would favour stricter fertiliser management regulations. 34% of respondents in Germany and 23% would like to have stricter regulations for reducing livestock density.

The column 'Motivation of farmers driven by…' reveals that oftentimes, each farmer mentioned a combination of reasons, which is captured by showing that for each measure, all three reasons played a role.

Table 1: List of measures for nutrient reduction and their social acceptance. Mand. = mandatory, Volun. = Voluntary.

Measure		Bindingness		Social Acceptance presents the data from the citizen survey, showing how many citizens prefer stricter regulations.	The motivation of farmers is driven by… presents farmers' motivations for implementing measures based on the farmers' statements on this topic in the interviews.		
		Mand.	Volun.	Citizens want the measure to be stricter?	…Agriculturally professional reasons	…Ecological reasons	…Economic reasons
1	Fertiliser Management regulations	x		**Rather 'yes'** 38% (DE) want more than the current status 22% want more than the current status (NL)			
2	Reducing livestock density		x	**Unclear** 34% (DE) and 23% (NL) want more than their current status, but many select 'undecided'			
3	Buffer Strips[56]	x		**Rather 'yes'** 35% (DE) and 21% (NL) wish for measures to be extended, 44% (DE) and 43% (NL) feel they are sufficient.			
4	Undersowing		x	N/A[57]			

[56] buffer strips are mandatory in Germany since 2020 with a width of 5 metres, whereas in the Netherlands 3-metre buffer strips are also mandatory, but in dry, summer conditions only 1m distance is obligatory. (Landwirtschaftskammer Niedersachsen, 2024; COMMISSION IMPLEMENTING DECISION (EU) 2022/2069, 2022)

[57] Where N/A is filled in the column ‚social acceptance', the respective measure was not included in the survey to citizens, due to time/ specificity reasons and therefore cannot be evaluated.

5	Catch crops	X (in NL)	x	N/A			
6	Reducing the turnaround in soil cultivation		x	N/A			
7	Applying fertilisers as close to the soil as possible		x	N/A			

Legend	low	medium	high	no data

We are interested in understanding the popularity of the measures, because some measures to reduce nutrient pollution are implemented because they are legally binding, whereas others can be taken voluntarily. For example, in Germany, the establishment of buffer strips along water bodies is mandatory under the Fertiliser Ordinance. In the Netherlands, such buffer zones are mandatory, too, after the derogation is stopped. This reflects differing regulatory approaches to nutrient runoff control between the two countries, as presented in the report by Gericke et al. (2022 (deliverable 2.2 of this project). In the Netherlands, a unique measure was the now-defunct MINAS system, which imposed financial levies on farmers whose nutrient surpluses exceeded set limits, allowing flexibility in how reductions were achieved. Since then the "Gebruiksnorm" (fertiliser regulation) regulates the amount of fertiliser (N&P) for each specific crop. In Germany, calculating and limiting nitrogen surpluses to 70 kg N/ha by 2030 is still a goal from the German Sustainability Strategy- it is not legally binding, however.

In the following, the assessment of citizens is shown for the three main measures that we asked them about:

3.2.1.1. Measure 1: Stricter guidelines of fertiliser management:

Figure 13 shows that most citizens believe fertiliser management regulations are sufficiently implemented. However, more people in Germany (38%) think that fertiliser management regulations are not extensive enough. Accordingly, the willingness to tighten measures and regulations is significantly higher in Germany. In the Netherlands, people seem more sceptical about tightening fertiliser management (63% think it goes too far or is sufficient; in Germany, only 50% do).

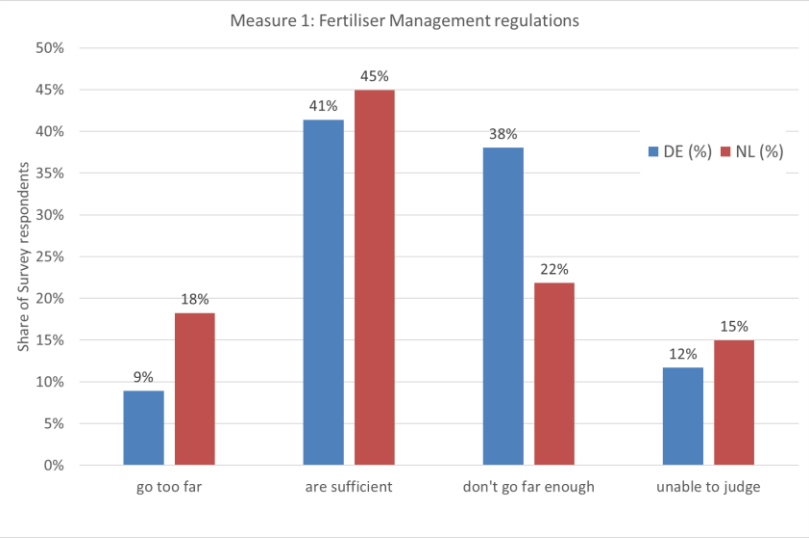

Figure 13: Citizens' assessment of sufficiency of fertiliser management

3.2.1.2. Measure 2: Nutrient reduction by reducing livestock density

As visible in Figure 14, the reduction of livestock density is more pronounced in the Netherlands. 35% of the people believe that the measures are sufficient, and 23% believe that they don't go far enough—a relatively high number of respondents, 26%, state that they cannot judge this measure. In Germany, 34% of the sample believe that the extent of the measure is insufficient.

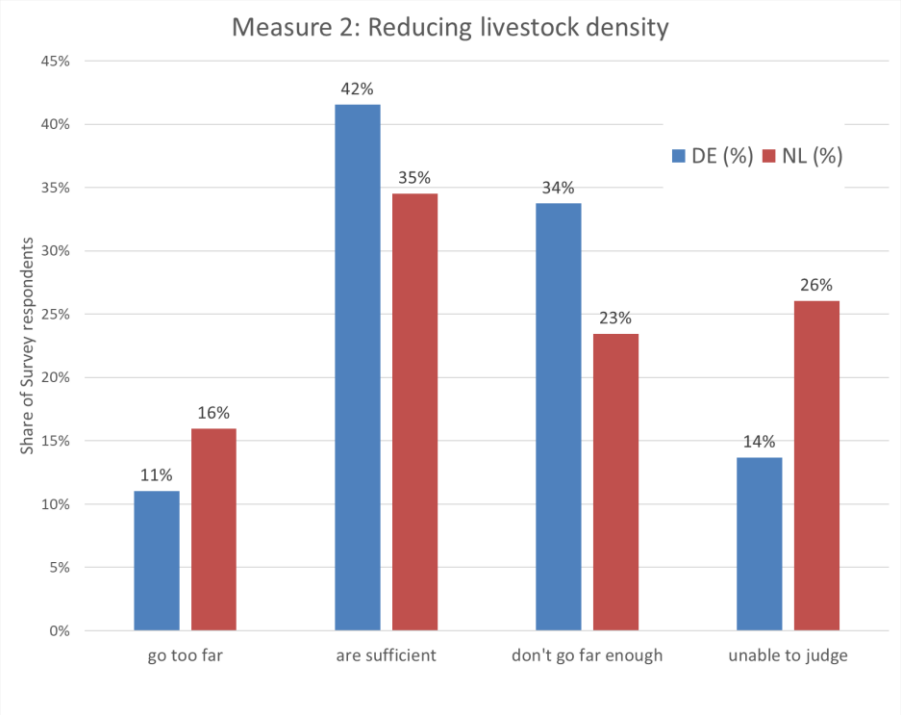

Figure 14: Citizens' assessment of sufficiency of reducing livestock density

3.2.1.3. Measure 3: Nutrient reduction by widening the buffer strips

As shown in Figure 15, widening riparian zones is that 44% and 43% of respondents believe that the measure is sufficient, from Germany and the Netherlands, respectively.

It should be noted that in the Netherlands, more people tend to feel they cannot provide an assessment of this (25%), while in Germany, only 13% state that they are not able to judge.

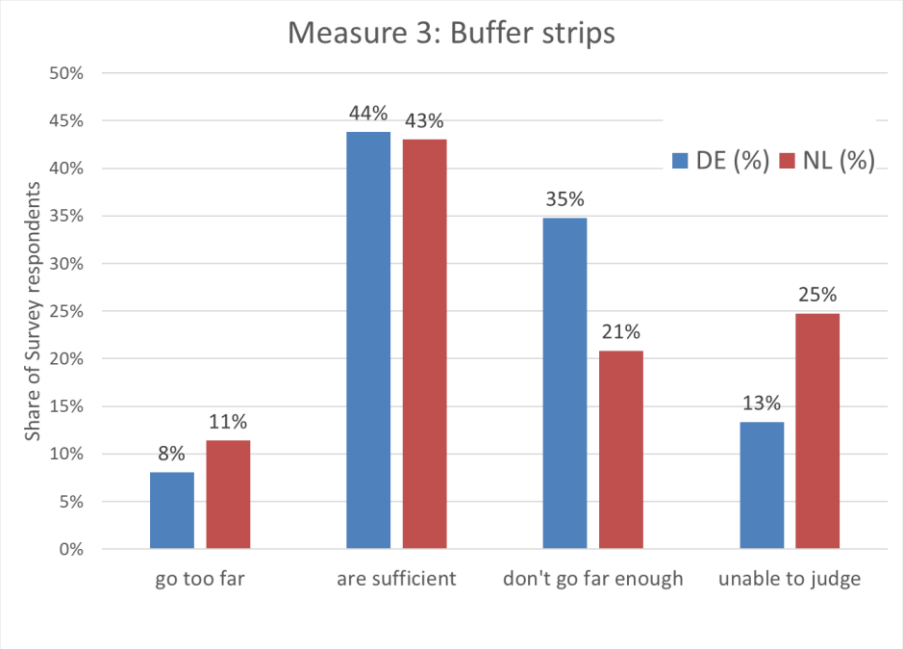

Figure 15: Citizens' assessment of sufficiency of widening the buffer strips

Citizens generally support nutrient reduction efforts and believe stricter regulations are warranted, particularly in Germany. However, public understanding of specific measures appears limited, especially regarding livestock density, where many respondents felt unequipped to assess effectiveness. This gap suggests a mismatch between broad support for environmental protection and the technical complexity of agricultural policy.

The survey results highlight a nuanced public perception of the effectiveness and sufficiency of nutrient reduction strategies in Germany and the Netherlands. Among the three measures assessed—stricter fertiliser management, reducing livestock density, and widening buffer strips—there is general public support, although national differences in perceptions exist. German respondents are notably more inclined to believe that fertiliser regulations are insufficient and express greater willingness to tighten such regulations. In contrast, Dutch citizens are more cautious, with a larger share believing current measures are adequate or even excessive.

Reducing livestock density received less definitive responses, particularly in the Netherlands, where a significant portion of respondents felt unable to assess the measure. This suggests a lower level of public engagement or awareness regarding the specifics of livestock-related nutrient impacts. Interestingly, while the widening of buffer strips is widely viewed as insufficient in Germany, Dutch respondents again show more uncertainty in their assessment.

Overall, from the citizens' perspective, there are more people who find the measures appropriate or wish for stronger measures than people who deem the measures too strict: The majority of the respondents believe that the measures are sufficient, with 40-45% for each of the measures, judging the current level of measures as sufficient. 8-18% of respondents (depending on the measure) judge that the measures go too far, and 21- 38% state that the measures don't go far enough. Also, quite a lot (13-26% of the respondents) state that they are not able to judge.

3.2.2. Does the acceptance of measures depend on the respondents' distance to the Wadden Sea?

Figure 15 indicates that people are aware of the impacts of eutrophication on biodiversity. It can be assumed that people who live close to the Wadden Sea care more about the environment than people living far away, as people living close see the environmental changes more often. So, in theory, it could be that those living close are asking for stricter measures than those who are less aware of the change in the ecosystem. However, according to our data, there is no clear trend visible.

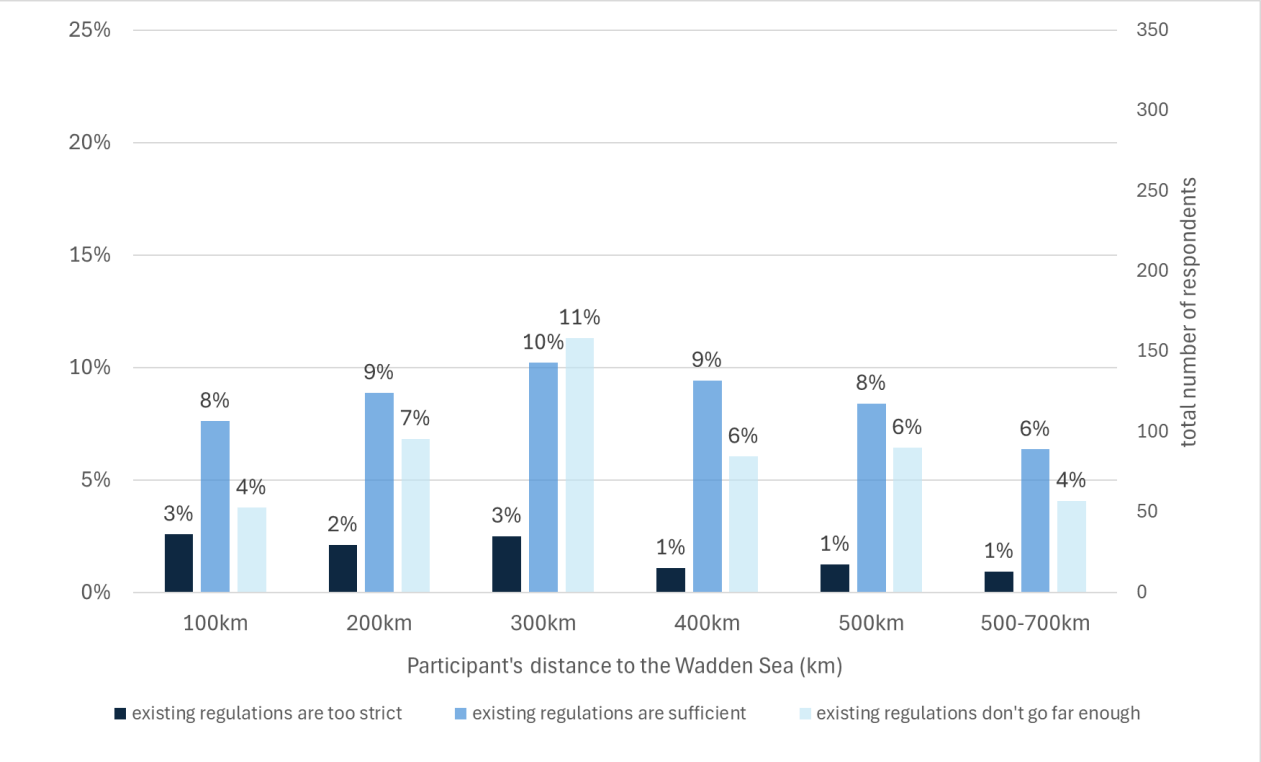

Figure 16: Citizens' judgement on regulations plotted against their location from the Wadden Sea

Figure 16 illustrates how opinions on environmental regulations for the Wadden Sea vary depending on respondents' distance from the area, ranging from 50 km to 700 km. Responses are divided into three categories:

- Light orange bars represent respondents who believe existing regulations are too strict.
- Light blue bars show those who feel the current regulations are sufficient.

- Light Green bars reflect respondents who think regulations should be stricter.

Across all distances, the majority of respondents consider current regulations to be sufficient, as indicated by the consistently high light blue bars (ranging from 43% to 57%).

The view that regulations should be stricter (green) is more common among those living 225 km or more away from the Wadden Sea. The highest value is at 49% at 225 km and remains relatively high beyond that. The belief that regulations are too strict (light orange) is the least common overall, with percentages dropping to as low as 7% at 400 km and remaining below 15% at most distances. Interestingly, those living closest (50–150 km) show the highest percentage of respondents who think the regulations are too strict (up to 21%).

Only a minority (7%-21%) thinks existing regulations are too strict (light orange columns), more or less irrespective of their distance to the Wadden Sea. The majority (43%-57%) believes existing regulations are rather sufficient, more or less irrespective of their distance to the Wadden Sea. 32%-46% of the respondents believe that regulations should be stricter.

3.2.3. Farmers assessment of the measures

The interviews with farmers provide an important counterpoint to citizen opinions. Farmers proposed a range of practical and often ecologically sound strategies not directly addressed in the survey. These included precise fertilization techniques, soil monitoring, and controlled drainage. Notably, farmers did not advocate for reduced livestock density, highlighting a potential disconnect between public expectations and agricultural feasibility or acceptance.

Amongst farmers' motivations to implement measures, farmers' strongest motivations are economic (e.g., limiting fertiliser use overall) and ecological (e.g., establishing buffer strips and riparian zones). The differences in green colours in the table are based on the findings on farmers' motivations (also see Chapter 3.3).

Farmer motivations are multifaceted, blending compliance with legal requirements, professional standards, and economic rationality. Many implement measures because they "make sense" agronomically—like saving costs on fertiliser—or because they align with long-term soil and water health. Ecological motivations also appear, though often tied to broader visions of sustainable farming. Social pressures or societal expectations are rarely mentioned as direct motivators.

Farmers express mixed views: while some accept the necessity and outcomes of certain regulations—such as buffer strips or fertilization limits—others criticize these measures as rigid, poorly adapted to on-the-ground realities, and inconsistently enforced. Many comply out of legal obligation rather than intrinsic agreement, and several emphasised that their initial resistance softened over time once they recognised practical benefits. Still, concerns remain about the shift from voluntary to mandatory approaches, which, while economically efficient for the state, often leave farmers without compensation for ecologically beneficial practices.

In the interviews, farmers commented on whether a measure's binding nature made sense to them. Interestingly, some farmers commented that they agree with (some of) the mandatory regulations and believe they make sense and lead to good outcomes, even if they were annoyed when the regulations first came out because they disliked being told what to do. With time, they could accept and adapt. For example, related to buffer strips, some farmers do not fully agree with the measure or remain sceptical because they don’t agree with the regulation („ So I can understand that with pesticides, but with fertilization, in my opinion, two or three meters would have been enough.“) they still comply with it, because they are required to do so. When asked if they would add buffer strips if they were not required to, some respondents said they would not, but now they have got used to it and don’t mind having them.

One farmer expressed concern about the shift from voluntary to mandatory measures, emphasising the significant implications of this transition. While voluntary participation might come with financial incentives or recognition, mandatory compliance, once codified into law, eliminates the possibility of remuneration. The farmer illustrated this point by referencing orchard management: if it is voluntary, it may be eligible for support, but once protected by law, compensation is no longer possible. This, he argued, reveals a structural issue in policymaking—where legal protection can paradoxically undermine the ability to reward environmentally beneficial practices. Drawing a comparison to everyday legality, he remarked that rewarding someone financially for not committing a crime, such as theft, would be illogical. Yet, a similar logic is applied in agriculture. Verge strips were cited as another example: once legally mandated, farmers must implement them without compensation simply because it is a legal requirement. The farmer concluded that while such legislation may be economically efficient for authorities, it burdens agricultural producers considerably.

To obtain a more nuanced view on measures- and how they are implemented, we captured what farmers liked or disliked about each measure in the interviews. Unlike in the citizen survey, they were not provided with concrete examples of measures they should judge. Instead, farmers were invited to share (good) practices they deem proper for nutrient reduction. The following list consists only of measures that several farmers mentioned:

1. **Applying fertilisers only when the timing is right and only if necessary** (understanding and respecting volume limits). This measure was mentioned by 17 farmers. Farmers state that this measure prevents leaching into the system and runoff. Additionally, due to the CAP on the amount of fertiliser, it becomes even more important to do it at the right time; otherwise, the yield will be lost. This includes only applying fertilisers if the weather conditions are suitable for it and using commercial fertiliser only through section control, through a satellite-based system and/ or reducing commercial fertiliser altogether. For example, one farmer who agrees with the limitations of nutrients stated that it's a good thing that it's no longer possible to say, „ Oh, it's not really growing yet. It needs to be given a little more." Specific measures include adjusting the spray plan developed with integrated crop protection and applying fertilisers mindfully (also to save costs).
2. **Intercropping and using catch crops.** This measure was mentioned by 18 farmers. Farmers mentioned that if done carefully with the right crops, and mainly if a mix of crops is used and monitored well, the advantage is that less fertiliser is needed because when the crops used for intercropping are fouling in the winter, they discharge part of the nutrients back to the system, and are taken up by the next cultivation phase. The farmers mentioned that this technique is attractive from a professional farming perspective: „Now the catch crop story, which is (...) let's say simple in that many farmers do it anyway, so there is a kind of bandwagon effect. "
3. **Planting buffer strips**. This measure was mentioned by 12 farmers. It is deemed viable and easy to implement, logical: „ Well, I think you should give up a little bit of space and ultimately, it doesn't make that much difference. "Some mention they had buffer strips years before it was mandatory.
4. **Monitoring soil quality and health through tests.** This measure was mentioned by nine farmers. This measure was frequently mentioned, but it deviated strongly from who should do the soil tests (the farmers themselves or external control) and how often and regularly the soil is measured. Most farmers find monitoring useful in calculating the amount of residual nitrogen in the soil, planning the amount needed, and adding only the correct amount.
5. **Undersowing.** Seven farmers mentioned this measure. Some farmers use this technique and point to benefits across the seasons, such as sowing clover grass, „And then I also have cover over the winter. It doesn't lie fallow, and the following year, I have a full yield from the clover grass because I've basically saved myself the trouble of planting it.". This integrated crop protection technique has the additional benefit of reducing pesticide use and being cost-effective. A further benefit is that it fights nematodes. These are pests that live in the soil. It's good for the water balance. It builds up humus, which absorbs CO2, binds CO2 from the atmosphere, and improves soil fertility. „So, it's also a measure that makes a lot of ecological sense and brings me economic benefits."
6. **Reducing the turnaround in soil cultivation.** This measure was mentioned by four farmers. Prodding and moulding instead of ploughing: Some farmers use prodding and moulding techniques over ploughing because there is usually more organic matter on the surface, which absorbs more water. It also prevents large amounts of nitrate from being converted and washed out again. However, this decision cannot be implemented immediately, as applying techniques that work with organic mass requires a systematic change.
7. **Treating drainage areas with extra care.** This measure was mentioned by four farmers. Specific treatment for nitrate in case of drainage in dryer soils/ less water: „In the nitrate sector, we are, of course, determining fertiliser requirements and where I think there is still a lot of scope for improvement is in drainage management. There are a lot of drained areas, and you have to think differently about them. And what I'm missing here is the scientific analysis together with the practical side, who have been thinking a lot since the drought about drainage, how to keep the water in the areas for the dry season and actually collect the water for dry periods in the wet years. And that would mean far, far less water would run off directly into the surface waters. Drainage is a huge issue that really needs to be addressed scientifically." According to a Dutch farmer, level-controlled drainage works well as it keeps the land moist during dry periods and reduces nutrient leaching.
8. **Applying manure and artificial fertilisers as close to the soil as possible.** This measure was mentioned by four farmers. This measure includes techniques such as precision fertilisation. „If we [the farmers] use it on grain, for example, where it can't be worked directly into the soil, then we do it with a drag hose or a drag shoe. For example, if we use it on sugar beet or potatoes, it is worked directly into the soil. Then a cultivator is used to make a slit, the slurry is pumped in, and then immediately closed again so that it all happens within a fraction of a second."
9. **Feeding N and P reduced food** to the farm animals, specifically to reduce phosphorus excretion from pigs. This measure was mentioned by two farmers. The two farmers that mention this measure state

that feeding N and P reduced state that it may be the easiest way to reduce phosphorus within the farming process.

It should be noted that no farmers brought forward a reduction in livestock density, which is seen as key to reducing nutrient reduction by science[58]. Overall, the stricter fertiliser management, reducing livestock density and widening buffer strips are deemed sufficient by the majority of the interviewed farmers.

3.2.4. What effects are expected by citizens if measures were stricter?

As part of the study, we also wanted to understand what citizens expect as effects of stricter measures. This subchapter presents the negative and positive effects that citizens expect if measures were made stricter.

Citizens were asked about the effects they believe a strictening of the policies would have: „Suppose stricter mandatory nutrient reduction measures through fertiliser management were imposed on farmers. Which of the following would you expect to happen due to stricter regulations?“ Where each of the statements were evaluated:

1. Nutrient pollution of rivers and the Wadden Sea will be reduced.
2. Biodiversity in and around rivers will be enhanced.
3. The financial burden on farmers will increase due to the transition to sustainable production methods.
4. The administrative burden for affected farmers will increase.[59]
5. There will not be sufficient funding to support farmers in converting their operations.
6. The necessary controls to enforce the measures will be lacking.
7. Agricultural land will likely require more space for production with less fertilisation.
8. The cost of food will increase.

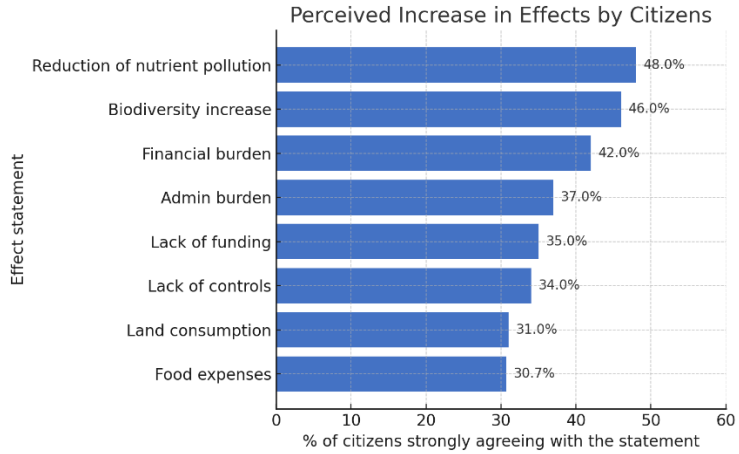

Figure 17: Citizens' assessment of the effects of stricter measures for nutrient reduction[60]

Figure 17 shows the perceived increase in various effects as reported by citizens, based on the percentage who strongly agree with each statement. 48% of respondents indicate a strong perception that nutrients will decrease, closely followed by 46% believing that there will be biodiversity loss. Related to the effects on the farmers, 42% of citizens feel that the financial burden on farmers will rise. Administrative burden and lack of funding are also notable, perceived to have increased by 37% and 35% of respondents, respectively. Meanwhile, 34% believe there is a growing issue with a lack of controls. Concerns about land consumption and food expenses are less strongly felt, but still relevant, with 31% and 30.7% of citizens, respectively, agreeing that these effects have intensified. Overall, the data reflect a high level of public awareness of environmental and socio-economic pressure in that people believe nutrient pollution will decrease and biodiversity will increase if the nutrient measures are stricter. However, citizens also indicate that they expect various burdens for the farmers.

[58] Bielza, Weiss, Hristov & Fellmann (2025).
[59] When interpreting this, it should be noted that expectations 6 and 7 (see above) describe positive expectations or effects of the measure on the water bodies and their environment. All other expectations (1-5 and 8) concern expected negative economic and administrative impacts upon implementation.
[60] This graph was used processing own date and changed the graphy type with OpenAI. (2025). ChatGPT (July 16 version) [Large language model]

Citizens also anticipate both environmental benefits and economic challenges from stricter regulations. While most respondents expect improved water quality and biodiversity, concerns about increased costs—for both farmers and consumers—are prevalent. This underscores the importance of coupling regulatory measures with financial and technical support for farmers to ensure the success and public acceptance of nutrient reduction policies.

3.3. Farmers' considerations on nutrient reduction measures

3.3.1. Economic pressures

Farmers highlighted the increasing difficulty of maintaining operations amid pressures like the war in Ukraine, rising costs, and market instability. They noted they were once more willing to try new measures, but are now sceptical of those that reduce income without sufficient compensation. Dutch farmers specifically expressed concerns about the economic viability of water quality measures, citing low payments for green-blue services and impacts on family farms and rural life. Many criticised laws that mandate environmental practices like buffer strips without ongoing financial support, arguing that this undermines agricultural sustainability.

Another major concern was the lack of flexibility in agri-environmental measures. Farmers must adhere to commitments regardless of changing conditions, even when ecological outcomes are compromised, such as planting cover crops in unsuitable weather. The rigidity of regulations was seen as a burden, especially when weather conditions don't align with fixed agricultural schedules. Some practices, like oversowing, are not always feasible if harvests are delayed. Additionally, local landscape features affect which measures are suitable; for instance, undersowing may not be practical in flat areas compared to erosion-prone regions where it has gained more traction.

3.3.2. Legal and administrative pressures

Farmers expressed strong frustration over agricultural regulations, which they often find arbitrary, impractical, and disconnected from actual farming practices. Many questioned the logic behind specific rules, such as reporting Nmin values before fertiliser application without follow-up recalculations, or being forced to use certain fertilisers regardless of efficiency or environmental impact. The classification of land into nitrate-vulnerable zones or biosphere reserves was another major source of discontent, as it limits farmers' autonomy while providing them no influence over land management decisions. There was a general perception that water protection policies are outdated, reactive, and driven by EU mandates rather than region-specific needs. See box 1, for example, as well. Farmers called for more transparent, locally tailored solutions and clearer communication from authorities, and frequently stressed that the regulations have to become more flexible, as they are agitated with constant changes: ,, Oh, you can do that today, you can't do that anymore today, you can do that tomorrow, you can't do that tomorrow.''

Example 1:
,,The EU once determined that there are too few meadows and that meadows regularly become arable land. And this has led to the fact that no more meadows can be ploughed up. So far, so good. But the fact is, if you have a clover-grass patch, for example, that you leave standing for five years, then it automatically becomes a meadow, and its arable status is revoked, which means that clover-grass patches are simply ploughed up every five years, even though you would have left them standing, in some cases because it's simply a poor field. But you lease the field, and the lessor is upset if his field suddenly becomes a meadow because it's worth significantly less. (..) As a result, there would be considerably more grassland if we didn't have this regulation, I would argue, because people have realized that if you have these locations, then they will remain meadows, because they're not arable, because they're often too wet.''

Example 2:
,,The important thing is that we, or the young farmers who continue, need to be given security. Let me put it this way: if they build a barn, they should be guaranteed that they can operate it for 20 years and not like at the end. I built my last barn in 2015 and then after seven years I got notice that I could only operate it for another ten or five years because it was no longer acceptable. Let me put it this way: I have a loan for 20 or 25 years for the barn. It can't be that I have to invest again before the barn is paid off, so that I can carry on keeping pigs. Or these numbers of animals. The barn was designed for this number of animals, and I can no longer keep these animals in there like it was approved back then. (..) In the long run, the banks aren't going to play along anymore. I would say that if we do not get any binding statements or usage times, then no young farmer will be able to rely on it and will not be able to plan.''

In the interviews, 30 comments reflected farmers' views that regulations are disproportionate and overly restrictive. Many expressed frustration that they can only operate within imposed limits, even when those seem illogical or contradictory to practical farming experience. Some noted inconsistencies between current policies

and the EU's earlier codes of good agricultural practice, which guided their training. Farmers generally preferred more autonomy to apply their knowledge without excessive documentation. While most shared this sentiment, a few accepted the existing regulations as necessary.

This frustration was compounded by a sense of unfair treatment compared to other polluting sectors. Additionally, farmers voiced irritation over the administrative burden of compliance, especially when enforcement against non-compliant farms is perceived as lacking. One farmer described knowing multiple local operations that visibly misuse fertilisers without facing consequences, underscoring concerns about uneven regulation.

Administrative demands also drew criticism, as many felt overwhelmed by paperwork that seemed to serve no practical purpose. This was especially frustrating for the respondents when reporting obligations did not lead to meaningful feedback or action. Government communication and policy implementation were generally criticised as top-down, one-sided, and lacking transparency. In the Netherlands in particular, many respondents felt misrepresented and excluded from policymaking processes, calling for greater dialogue and inclusion of practical agricultural knowledge. Some farmers acknowledged the support of water boards in areas such as subsidies, but others saw them as focusing on surface-level fixes rather than systemic improvements.

A recurring concern was the lack of long-term clarity and planning security. Many farmers felt that regulations change too frequently and lack continuity, making investment in sustainable practices risky. In the Netherlands, especially, there is strong general mistrust of government and advocacy groups. Some call for more collaborative, region-specific policy approaches that value local knowledge. In Germany, 16 farmers, who spoke about their critical view of agricultural policies, gave elaborate examples of how they struggle to keep up with the paperwork and reporting, and/ or the planning issues they face. Although some hope new systems like KPI-based approaches might offer improvements, most remain sceptical due to previous experiences with broken promises and shifting policy priorities. There is a clear need for more reliable, consistent governance that better aligns with the realities of modern farming.

The findings show that while voluntary participation in such measures can limit environmental impact due to low uptake, flexibility and institutional collaboration, particularly in the Netherlands and parts of Germany, voluntary participation plays a key role in enhancing acceptance. This is reinforced by the differing perceptions of cooperation and advisory services, which are shaped by factors such as farming experience and formal training. The measures discussed, particularly those linked to KTM 2, 12, 14, and 17, reflect national and EU policy frameworks such as the Nitrates Directive and CAP, yet their effectiveness ultimately hinges on how well they are received and adopted by key stakeholder groups. Therefore, designing future scenarios for nutrient reduction in the Rhine basin should not only account for ecological effectiveness but also for the socio-political dynamics identified in this study.

Farmers shared a wide range of ideas on how the shift to more sustainable practices—especially those that reduce nutrient pollution—can be supported. A key message was that political action needs to go beyond control and enforcement. Instead, policies should align with sustainability goals and create fair conditions for farms that are already leading the way. This includes adjusting subsidies to reward environmental services like biodiversity or clean water, rather than just land size. Trade policies should reflect EU sustainability standards, and organic certification needs to remain trustworthy and strict. Many farmers also stressed the importance of involving independent science in policy decisions, reducing industry influence, and making sustainability a shared goal across sectors like energy, food, and trade. Public awareness campaigns and transparent food pricing could further support eco-friendly choices. Ultimately, politicians should listen more closely to both expert advice and farmers' practical experiences to build policies that are effective and realistic.

On the ground, farmers themselves are ready to contribute—but they need the right conditions to do so. Many highlighted how current regulations, especially on fertilization, can feel too rigid and disconnected from actual field conditions. They called for more flexibility and recognition of their knowledge about local soils, crops, and weather. A fairer economic foundation is also crucial: ecological measures must be financially viable, with appropriate incentives and risk compensation. Better advisory services and more opportunities for farmer-to-farmer learning were also seen as key to making sustainable practices more accessible and effective. Farmers also expressed concern about land being treated as an investment rather than a livelihood, making it harder for active farmers to access land. They stressed the need for long-term planning certainty, reliable support systems, and a stronger public understanding of the complexity and value of modern farming.

3.4. Enablers for the implementation of measures

To judge social acceptance, we also wanted to factor in the farmer's motivation to implement the measure as one of the key aspects of whether a measure is implemented and how thoroughly. This chapter highlights some of the considerations and motivating factors that lead to the implementation of measures.

Agricultural professional motivations (connected to the correct management of the farmer) were mentioned much more often (33 times) than economic (10 times) and ecological (10 times) reasons. Only one farmer explicitly mentioned the societal pressure they feel: „ On the other hand, it is also clear that we have a social obligation to ensure that we do not cause unnecessary nutrient inputs or pollution of the waters.“

The interview transcripts reveal that some farmers implement measures because:

- they have to, others for ideological reasons,
- „it makes sense“ and aligns with their professional aspiration, for environmental reasons,
- out of conviction, or
- of economic and financial reasons.

In the interviews, almost all farmers mentioned more than one reason when asked why they implement measures. One typical reply was, „because it's certainly required by law. But it's always a question of money. And the third thing is that we want to preserve our environment for the next generation.“

The implementation of voluntary nutrient reduction measures in agriculture is shaped by a complex interplay of motivational, ecological, economic, social, and operational factors. Interviews with farmers reveal that while legal obligations are a major driver, personal convictions, economic incentives, and ecological awareness also motivate action. Many farmers view sustainable nutrient management not only as a compliance issue but as a matter of professional pride and practical efficiency. However, the depth of ecological motivation varies, with only a few farmers explicitly articulating long-term environmental concerns, such as groundwater quality and biodiversity, as standalone reasons for implementing measures.

3.4.1. Enablers linked to environmental motivation

The ecological reasons as to why farmers are motivated to implement measures are linked to their values, beliefs and responsibility perception when it comes to environmental protection. In the interviews, comments on this topic remained on the surface. The statements that were made are mixed with convictions on future visions, nature protection, and frustration with the system as it is, and with comments on the state of the soils. There are no important differences between Germany and the Netherlands.

The ecological motivations are rooted in wishing for structural change of the current farming system towards more sustainability and, according to some, because food should be produced as environmentally friendly as possible. Where possible, the farming sector should promote sustainable practices for the protection of soil and water and enable nature protection.. Some farmers state that they try focusing mainly on the root causes of nutrient enrichment, such as humus accumulation and organic matter accumulation, because they believe that is the practical solution to water quality problems. They feel that non-environmental solutions are only symptom management. One farmer reflects, „ I could probably be in a different financial position if I didn't place so much value on environmental protection. But I don't want that“, and simultaneously acknowledges that he feels it is a luxury.

Other farmers praise ecological solutions such as planting clover for undersowing as a win-win measure, because it is good for the environment and good for their wallet. When farming in so-called 'Red-areas' with a high nitrate concentration in the groundwater, the concern over the groundwater quality spills over to considerations on surface water, too, and can spark nitrate-minimising measures. For ecological reasons, most farmers gave a distinct example of a measure. For instance, buffer strips provide essential habitats for various organisms, including beneficial species and pests, contributing to overall ecological balance. Their value extends beyond reducing nitrogen leaching, making them beneficial regardless of financial incentive, and many farmers believe it is right to implement them for environmental reasons.

In other interviews, it was clearly stated that farmers are not responsible for nature restoration tasks as long as they are not compensated for them. Many farmers commented that they are happy to contribute to nutrient reduction if they can but that their priority is to be able to run their farms well.

3.4.2. Enablers linked to agronomic motivation

Acceptance of nutrient-reducing measures among farmers is often driven by agricultural professional motivations, and to a lesser extent by economic and environmental reasons. This is evident in how some farmers initially resisted certain mandatory measures but later accepted them once their utility became apparent. Such adaptation—compliance, motivated by efficiency, is distinct from voluntary adoption based on internalised practical or ecological values. The shift from voluntary to mandatory policies imposes a sensitive transition: farmers feel that once a measure becomes law, it may no longer be eligible for support, reducing incentives.

Various farmers include regular soil and nutrient analyses—partly funded by local water utilities in water protection areas in red areas—and in-season monitoring of plant growth to adjust fertilisation accordingly. Mid- to long-term strategies such as undersowing, buffer strips, precise fertiliser application, crop rotation, and deep-rooted plants help bind nitrogen and phosphorus more effectively, improving nutrient use efficiency and supporting soil health. One farmer explained that they are not trying to make a monoculture on a meadow but rather encourage various species because this is also good for the animals. They implement these measures because they are logical from a farming perspective. Many add that, regardless of whether it is mandatory, they do it because it makes sense.

There was a disproportionately high number of references to mandatory measures: many farmers reflected on the obligations they must meet and how their activities are monitored—from land use and crop or animal types to their needs and related fertiliser purchases. They often describe the required administratively intensive work for farming activities in detail to emphasise their close adherence to and the necessity of complying with these regulations. Many farmers comment and praise the development, saying that due to adapted farming practices, they feel that way fewer fertilisers end up in rivers and streams. In contrast, others are unsatisfied with the current system, which allows them to farm in nature nature-friendly way, but does not reward them for it, such as an organic farmer from Germany whose „ the goal is to cultivate the land as close to nature as possible. I usually have between 20 and 30 flowering plants on my land, and I try to thin out the areas in a targeted manner, but there are limits to doing this, because I also need to produce. I would like to be compensated for these actions.“

Regardless of whether a measure is mandatory or not, there were some clear trends from the interview statements from farmers on agricultural practices that seem widely accepted amongst the farmers:

- Needing to control the upper limits of nitrogen supply must be observed. In conventional farming, the upper limit is 170 kilos of nitrogen on average per hectare for organic fertilisers, but mineral fertilisers can be added.
- Pay close attention to the proportions and ratios of fertiliser applications regarding the appropriate time and volume of nutrients.
- Ploughing as late as possible so that the soil does not turn over.
- Manure and artificial fertilisers should be applied as close to the soil as possible, using techniques such as slot control fertilisation.
- Where possible, take advantage of exact fertilisation systems. This is beneficial because nutrient utilisation is enhanced, and fewer mineral fertilisers must be purchased and applied.
- That fertiliser should not be brought to the fields in the winter months, and manure storage facilities should be built where the manure is stored safely.
- Leaving a 3-meter buffer strip between the farmland and stream or river.[61]

This is important as the agreement of most farmers is a strong starting point to support measures and policies that help support the measures.

External pressure, particularly from rigid governance mechanisms, often shapes farmers' behaviour more than shared environmental goals. Nevertheless, where measures align with farmers' operational logic or contribute to long-term soil health, acceptance is higher. This suggests that policies fostering genuine adoption must recognise farmers' practical expertise and economic realities, rather than relying solely on enforcement. In contrast, citizen support for nutrient reduction appears more values-driven, even if actual behavioural change (e.g., sustainable consumption) remains inconsistent due to the value-action gap.

From the citizens' perspective, government regulations are seen as key to reducing nutrient pollution, but there is no clear support for stricter rules, and concerns about food prices prevail. A key barrier is the public's lack of awareness about the practical challenges farmers face. Citizens tend to focus on environmental outcomes rather than the feasibility of implementation, leading to unrealistic expectations. Although many recognise the negative impact of nutrient pollution—especially in Germany—the legal and administrative complexities behind solutions are largely unacknowledged.

Citizens assume that environmental responsibility should be a core part of farming, expecting farmers to act both out of duty and in the public interest. Their motivations for supporting nutrient reduction are rooted in ecological protection and public health. They tend to underestimate the complexity of on-farm decision-making or the financial trade-offs farmers face. For citizens, environmental protection is often viewed as a non-negotiable obligation.

[61] However, two farmers questioned the definition of streams and rivers regarding increasing drought. They stated that depending on how dry the area is (if the stream or river only have water for a few days per year), it might not be necessary.

Stakeholders, including industry representatives, local authorities, and interest groups, also play crucial roles, each bringing their own priorities and concerns. The findings reveal that farmers see themselves as only one part of a much larger system contributing to nutrient pollution and environmental strain. They consistently pointed to other key actors—such as industry, municipalities, households, and even policy itself—as sharing responsibility. Industrial operations, especially potash production and biogas plants, were flagged for their significant emissions, while outdated urban wastewater infrastructure and overloaded treatment systems were seen as persistent yet politically neglected contributors. Farmers also highlighted domestic actions, from detergent use to careless lawn fertilisation, as under-recognised sources of pollution. Importantly, some farmers criticised public narratives and policy approaches that disproportionately blame agriculture, urging a broader, more balanced view of shared accountability. It should be noted that the influence of stakeholders can shift over time as societal values evolve, political contexts change, or new information emerges. Therefore, a nuanced and dynamic understanding of social acceptance is essential for designing measures that are both effective and sustainable.

Citizens are largely unaware of the practical challenges farmers face in implementing environmental measures. Operational constraints are rarely considered in public discourse, which focuses more on outcomes than on feasibility. There is limited recognition of farming as a dynamic, context-sensitive profession. This disconnect may lead to unrealistic expectations regarding how quickly or easily practices can be changed.

3.4.3. Enablers linked to economic motivation

When enabling nutrient reduction measures, farmers have farming concepts in mind that they learned or proved to work with different economic variables in mind, mainly the balance between crop yields, nutrient use efficiency, and environmental impact. 68% of farmers argue that limiting nutrients is part of good farming practices, naturally from a professional point of view, with comments such as: „*No farmer has an interest in his nutrients ending up in the sea because they should be in the fields so that he can produce crops there.*“ This motive is related to the farming standards, but also closely tied to economic sensibility.

Every kilogram of (artificial) fertiliser that does not have to be purchased and applied saves costs, which explains why some farmers implement undersowing as a measure. The keyword most farmers used was *customised fertilising*, not to waste fertiliser as a resource. „ Economically, it’s, of course, quite clear: anything that you don’t have to buy, that doesn’t wash out, that doesn’t belong where it belongs, is a benefit. Instead, you just manage to fix it by undersowing.“ The financial viability of implementing measures that reduce the need for adding fertilisers is also connected to losing money, with superfluous fertilising and nitrogen being especially valuable for organic farming, mention the farmers. One farmer mentions that he implements some practices that reduce nutrients because of the financial support, which is „not negligible“, and made it more attractive to implement the measures, even if they entail effort. Like the section above, which is also related to economic sensibility, one farmer appeals to all: „Farmers need to use manure responsibly, for example, not spreading too much at once and having no thick layers along ditch edges. This is part of good farming practices, something we ourselves want because of cost savings.“

3.4.4. Enablers linked to socio-political motivations

Socio-political drives are societal dynamics and trends such as habits, behaviours, the enabling environment or cultural imprints that influence the decision-making of farmers when implementing measures. From a social perspective, while some farmers express a sense of responsibility toward society and the environment, many feel unfairly targeted compared to other polluting sectors. A perceived lack of proportionality and unequal enforcement exacerbates this sentiment. At the same time, some interviewees advocate for peer-driven accountability, suggesting that enhanced enforcement could help raise sector-wide standards without broad punitive measures.

Some farmers also reflect on how popular and reputable the measures are amongst farmers. With measures that aim to reduce nutrients, they feel some pioneers recently were able to lead the way and enjoy more approval, thereby helping to spread the measures. Additionally, there is a call to appeal to farmers’ professional pride, encouraging the implementation of nutrient reduction measures on all farms. Many farmers believe that applying measures in parallel (if each farmer does a little bit) will make these efforts easier to manage and more effective overall. Here, the formulated hope is that if all farmers did a good job and put maximum effort into nutrient reduction, farms' contribution to the nutrient issue would be negligible. From a skills perspective, one farmer mentions that „ I am able to operate my fertiliser spreader properly, which is not necessarily guaranteed for some people who do not have any agricultural training.“ The frustration with some other farmers not doing/ acting enough is also brought into the interviews from the perspective of control by authorities. Some interview partners state that if there were stricter controls, the ones not performing well could be penalised and become more careful, which would avoid general bans hitting all farmers.

One part of the citizen survey investigated the enabling factors for transforming nutrient measures, depicting what kind of policy efforts the citizens favour. The majority opinion, chosen by approximately 63% of respondents, was that politicians should impose requirements on companies while also providing sufficient state funding as an incentive for farming companies to restructure. This option clearly dominated the results, indicating strong support for a combination of regulation and financial support. In contrast, the other three options received significantly less support. About 12% of respondents believed that politics should not intervene in a controlling manner but should instead leave the ecological restructuring of agriculture to market mechanisms, such as supply and demand. Similarly, around 12% supported the idea that politicians should impose more concrete and verifiable requirements on farmers and ensure they are enforced. Approximately 10% of respondents stated that they could not decide between any of the given suggestions.

3.5. Citizens' possible changes for future nutrient reduction

Citizens, too, play a central role in transitioning the farming practices to lower nutrient release as the demand affects the production. Farmers hope that people will make more conscious food choices, buying regional and sustainably produced products not just in theory but in practice. Citizens purchasing local agricultural products means that good food has a price that reflects the effort and care behind it. Consumers are encouraged to see food not just as a product, but as the result of hard work, environmental responsibility, and long-term planning. Being open to learning more about how food is produced—through farm visits, transparent labels, or direct marketing—can help close the gap between urban expectations and rural realities. In short, farmers are ready to do their part, but they ask for real support from citizens—not just in words, but at the checkout counter.

The citizens were asked about what pro-environmental consumption behaviour they have adopted in the past (willingness to change) and which changes they are willing to make in the future, and show effort for (as part of the behavioural and attitudes parts of social acceptance). This was done by asking them about changes in their behaviour in the last few years and possible changes in the future from reducing meat consumption and eating more fruits and vegetables, purchasing more regional products despite higher prices, paying increased attention to avoiding food waste, and choosing products from organic farming more consciously.[62] Of these different options, survey respondents could pick as many options as they wanted. Over 66% of respondents had at least one pro-environmental behaviour, indicating a high willingness, not only willingness, but already having a more ecological lifestyle. This shows that respondents generally care and are willing to put effort into reducing nutrients with their own behavioural adaptations. However, these responses must be seen with a grain of salt as they are self-reported and respondents would likely reply more strongly in a way that they want to be seen (value action gap).

In the paragraphs below, the trends of citizens' willingness in terms of age, income and gender are discussed.

3.5.1. The effects on willingness to change

Figure 18 shows how respondents' willingness to change their consumption habits varies across different age groups. The responses are categorised into five levels of commitment, ranging from "absolutely not willing" to "very committed." Willingness to change are calculated based on survey results based on respondents' pro-environmental consumption behaviour that they observed in the last year in their behaviour, selecting a) reduced consumption of animal products and increased consumption of vegetable and fruits, b) consume more regional products even if they are more expensive, c) take care not to waste perishables and d) pay attention to consume more organic food (even if it is more expensive). Only binary (Yes/No) answers to these questions were possible.

[62] The different aspects that citizens were asked about are measures that can reduce nutrients directly or indirectly. Citizens were not asked about specific direct nutrient reduction measures in this part of the survey to receive understandable, tangible options of what citizens could do to capture their direct, honest response. The replies are then used as indicators to judge nutrient reduction behavior.

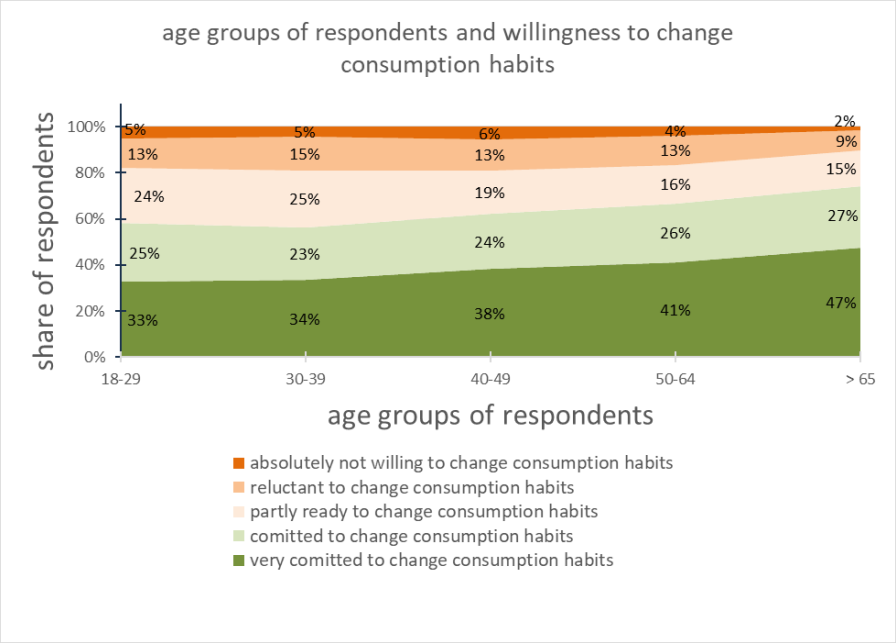

Figure 18: Age groups of respondents and willingness to change consumption habits

A clear trend can be observed: the willingness to change consumption habits increases with age. The share of respondents who are "very committed" (4× Yes) rises steadily from 33% among the youngest group (18–29) to 47% in the oldest group (65+). At the same time, the proportion of those showing low or no willingness to change decreases with age. Overall, older respondents appear more willing and committed to adopting more sustainable consumption behaviour than younger ones.

3.5.2. Income effects on willingness to change

Figure 19 illustrates the average self-reported effort for an ecological lifestyle ("efel") on a scale from 0 to 100, broken down by respondents' monthly household income. "Efel" is calculated based on self-assessment of the survey participants, indicating if they would be a) consuming fewer animal products, b) willing to pay more for animal products, or c) willing to pay a fee for the necessary restructuring of agriculture.

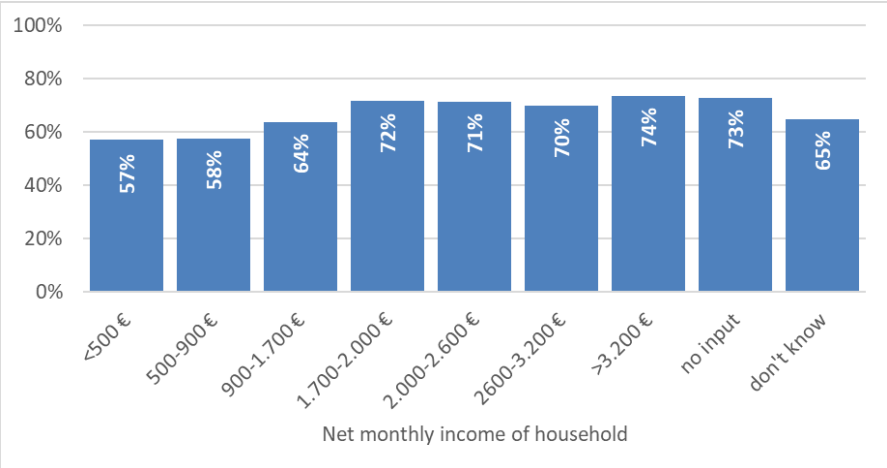

Figure 19: Average self-reported effort for an ecological lifestyle by income group

A clear trend emerges that individuals with higher incomes generally report making greater efforts to lead an ecological lifestyle, yet the increasing trend becomes less prominent above the monthly income of ca. 2000 €. This finding does not align with other studies that measure actual environmental behaviour and consumption, such as a study on per-capita consumption in Germany.[63] The difference is that while those in the lowest income

[63] Hrsg. UBA, Kleinhückelkotten, Neitzke, & Moser, (2016).

group (<500 €) report an average "Efel" of 57%, this value steadily increases across income brackets, peaking at 74% among those earning more than 3,200 €.

3.5.3. Gender effects on willingness to change

Figure 20 illustrates that females demonstrate a clearly higher willingness to change their habits and accept costs for the sake of environmental sustainability (based on the ‘’Efel’’ calculations, including measures reducing nutrient output.

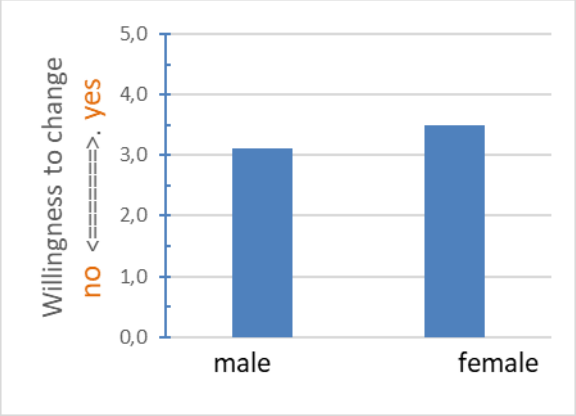

Figure 20: Current efforts favourable for nutrient reduction: Male and female comparison

Overall, gender, age and income appear to influence ecological behaviour, but in different ways—age affects willingness to change, while income shapes the ability to act. Younger respondents (18–29) show the lowest willingness to change their consumption habits, while commitment increases steadily with age, peaking among those aged 65 and older. In contrast, the effort already being put into leading an ecological lifestyle ("efel") tends to rise with income level, with individuals earning over 3,200 € reporting the highest average effort (74%). Lower-income groups (<900 €) report significantly less ecological effort, suggesting that financial constraints may limit sustainable behaviour despite potential willingness. Interestingly, the age group most willing to change (older adults) is not necessarily the one putting in the highest current effort, highlighting a gap between intention and capacity.

It is important to note that due to the formulation of the questions in the survey, the respondents likely have not only thought about their direct contribution to nutrient reduction, but also about their general efforts for a sustainable lifestyle. Female respondents reported a significantly higher effort in the past and a higher willingness to change to more sustainable practices.

The willingness to change has also been plotted against party affiliation of the citizens for German respondents (Annex V). The data suggest a clear link between political orientation and the extent of effort dedicated to maintaining an ecological lifestyle, with Green Party supporters demonstrating the strongest ecological commitment and non-voters showing the least.

Overall, the empirical findings presented in this chapter illustrate an ambivalent relationship between farmers and citizens: While the citizen survey expresses strong normative support for sustainable agriculture, farmers express different realities on the ground. This discrepancy manifests most clearly in concerns about inadequate compensation for environmental services and a widespread perception of social undervaluation. These findings echo and expand upon observations made in an earlier study[64] documenting similar tensions between agricultural policy, market forces, and farmers' experiences in the Baltic region.

A recurrent theme across the farmers’ interviews is the critical role of fair compensation as a condition for farmer participation in sustainability measures. Several respondents recalled being more open to environmentally beneficial practices under more stable economic conditions, but now feel squeezed by rising production costs, geopolitical disruptions, and stagnant or declining market prices. This aligns with findings from the German research project “GreenGrass” (2022), which highlighted that while many farmers are willing to adapt their practices to favour climate and biodiversity goals, their engagement is conditional upon economic viability. In the current situation, however, legal mandates—such as obligatory buffer strips—are often experienced not as supportive measures but as punitive impositions, especially when they remove the opportunity for financial

[64] Tisenkopfs et al., 2015.

recognition. This perspective complicates conventional policy narratives that assume regulatory enforcement and public goodwill are sufficient to drive ecological transformation in the agricultural sector.

A deeper integration of the results highlights internal contradictions and tensions within both groups. While farmers express frustration at consumers' cheap price focus, they also acknowledge the effectiveness of local engagement initiatives like farm open days in fostering mutual understanding. Similarly, while consumers often fail to act on their stated preferences, they are not a monolith; the presence of committed buyers and emerging consumer movements suggests potential avenues for reconnection. The challenge lies in transforming these limited cases of successful engagement into systemic conditions. Research from projects such as "SURE-Farm" (Sustainable and Resilient EU Farming Systems) supports this notion, emphasising the need for multi-actor cooperation and new institutional arrangements that reward sustainability both rhetorically and financially and structurally.[65]

4. Reflections and Conclusion

This study investigates the social acceptance of nutrient reduction measures in the Rhine River Basin. The Rhine is a significant source of nutrient inflow into the Wadden Sea. Social acceptance by farmers and citizens is important to consider when designing and implementing nutrient reduction measures.

The citizen survey and farmers' interviews show that both parties are aware of the problem of nutrient pollution to the Wadden Sea. A vast majority of the interviewed farmers actively follow discussions on this topic, and recognise the negative effects of nutrient pollution on the environment. Likewise, the majority of citizens are well informed about the causes and consequences of nutrient pollution problems, even by those living far from the Wadden Sea. The common knowledge base shared by different age groups and socio-economic classes is a welcome starting point. However, there are notable differences in how the responsibility is perceived and the ways in which a solution to the problem should be found.

Visions of future developments vary. Some farmers, such as the arable farmer, see opportunities in regenerative agriculture and other innovative practices. There is a general expectation that sustainability will continue, but also concern about its economic consequences.

Farmers highlight the misalignment between policy expectations and farming realities, including weather variability, crop cycles, and land-specific constraints. Many stress that rigid implementation rules—such as fixed sowing dates or blanket restrictions—undermine both ecological goals and productivity. The administrative load is a frequent complaint, particularly when seen as unproductive. Measures that are agronomically logical tend to gain more acceptance.

Farmer attitudes reflect a pragmatic interplay between values, legal requirements, and operational logic. While ecological awareness and a sense of professional responsibility play a role, many farmers are primarily motivated by economic viability and agronomic sense. Measures like precise fertilisation or crop rotation are accepted because they align with both ecological and (agro-)economic goals. Yet, farmers often perceive a disconnection between top-down policy goals and their own context-specific knowledge, leading to frustration when regulation feels out of step with on-farm realities. Another frustration comes from the presence of non-compliant farms that accelerate the eutrophication problem, and a lack of control and enforcement on them.

In contrast, citizens largely frame nutrient reduction as a moral and ecological imperative, assuming that farmers should act out of public interest and environmental duty. This reflects strong environmental values but also underestimates the structural and economic pressures facing farmers. Thus, while both groups may support the broader goals of nutrient reduction, their underlying values diverge: farmers seek a balance of ecological sustainability and practical feasibility, while citizens emphasise normative responsibility, sometimes detached from agricultural economic constraints.

The findings suggest that social acceptance of sustainable agriculture remains fragile and conditional. While there is no shortage of symbolic approval by citizens, this approval is often shallow, lacking the behavioural and institutional backing needed to translate values into enduring change. The current landscape is one where farmers feel burdened with transition costs while citizens remain distanced from the consequences of their consumption patterns. Bridging this divide requires fair compensation mechanisms, regulatory frameworks, and cultural work: efforts to reestablish trust, recognition, and mutual understanding between producers and consumers. The challenge is not merely technical but relational, requiring a rethinking of how food systems are

[65] Meuwissen et al., 2019

valued, governed, and socially integrated. Additionally, the increasing unpredictability due to climate change effects and the need for adaptation have been stressed in the interviews. Farmers need support in this process.

Similar to the CAP4GI project (a research project in Germany in 2024 that investigated options for biodiversity protection as part of farming practices based on experience drawn from 3 different regions each in the German states of Baden-Württemberg and Thüringen)[66], our study confirms that the problem is therefore not that farmers do not want to implement biodiversity-promoting measures, but instead that the design of agri-environmental measures creates many difficulties in their practical implementation.[67] However, the manifold aspects of why this is currently not working (variability in the farmers' perception that a measure is effective, capacity, lack of plannability, lack of compensation, etc.) combine to a relatively high barrier that must be adequately addressed.

Increasing administrative works, followed by increased regulations and obligations, were mentioned as one of the burdens by many farmers. In this light, designing efficient and simplified regulations may gain more support from farmers. However, simplifications in bureaucracy should not lead to a lowering of standards for ensuring environmental quality (which makes production possible in the first place), as recently happened with the EU Commission's far-reaching reduction of environmental requirements of the CAP in an expedited procedure.[68] Preserving biodiversity and easing the burden on agriculture must and can be achieved jointly by designing agri-environmental support and measures so that farms can implement them more easily and profitably. Furthermore, efforts to enhance consistency between different water policy instruments at the EU and national levels, as suggested in deliverable 2.3, would also help simplify the targets and reduce the required administrative work.

The farmers' interviews reveal a prevailing distrust in public support for sustainable agriculture. While there is widespread rhetorical and political endorsement for environmentally friendly and animal-welfare-oriented practices, farmers report that this support often fails to translate into material or economic backing. This discrepancy is most visible in consumer behaviour: despite professed values supporting sustainability, price remains the dominant criterion at the point of sale. Farmers express frustration at what they describe as "supermarket morality," where societal ideals are abandoned in favour of cheaper products, often imported and produced under lower environmental or social standards. These dynamics contribute to a deep insecurity among producers, especially in light of growing input costs, global market volatility, and increasing regulatory demands. One of the findings of the study is the perception among farmers that current nutrient reduction policies lack adequate compensation mechanisms, thereby threatening the economic viability of farms. Citizens shared concerns about the feasibility of implementing ecological measures—such as green-blue services or buffer strips—without sufficient financial support. About two-thirds of the citizens are supportive of providing state funding as an incentive for farmers to implement nutrient measures. Several farmers articulated their fear that once such measures are mandated by law, they lose any opportunity for voluntary compensation, further narrowing economic margins. This sentiment is particularly strong in the Netherlands, where arable farmers voiced concern about the long-term viability of family farms and the broader liveability of rural areas. The analysis also highlights how farmers perceive a growing cultural and emotional divide between rural producers and urban consumers. Many interviewees feel that citizens no longer understand the complexity and risk inherent in farming, nor do they appreciate the broader societal contributions made by agriculture—such as food security, landscape stewardship, and rural cohesion. Although some initiatives, like farm open days or direct marketing, are viewed positively for improving public awareness, these remain limited in scale and often do not lead to lasting changes in consumer behaviour or policy.

In conclusion, while there is clear potential for broad adoption of nutrient reduction measures, realising this requires a shift toward more flexible, regionally adapted policies. These should be underpinned by transparent communication, long-term planning, security, and fair economic support. Most importantly, involving farmers as equal partners in policy design and implementation will be essential to bridging the current disconnect and fostering more sustainable agricultural practices.

In terms of solutions, farmers proposed a more cooperative, fair, and goal-oriented approach to environmental policy. They are open to improving practices—especially if regulation becomes more flexible, locally adapted, and grounded in science rather than bureaucracy. They advocate for subsidies that reward actual environmental services, fairer market conditions, and recognition of ecological farming's added value. Independent advisory systems, long-term planning security, and better access to land were seen as practical levers to make sustainability work in everyday farming. At the same time, they call on citizens and policymakers alike to rethink rigid controls and support a broader shift toward sustainable food systems across sectors.

On the citizen side, survey data show a clear willingness to change, especially among older, higher-income, and female respondents. Most people across all income levels report at least moderate effort toward an ecological

[66] CAP4GI (2024)
[67] CAP4GI (2024)
[68] European Commission, 2025.

lifestyle, though affordability concerns remain among lower-income groups. This readiness to change offers promise—but must be understood in the context of the value-action gap: what people say doesn't always translate into what they do. Farmers acknowledge this, but still express hope that citizens will align their purchasing behaviour with their stated values—supporting regional, fairly produced food not only in surveys, but in supermarkets and farmers' markets. Only with shared effort, trust, and mutual responsibility can real progress toward sustainable agriculture be achieved.

The report concludes that social acceptance of nutrient reduction measures is fragile. While symbolic support exists, it lacks the financial, political, and behavioural backing necessary to enable a robust agricultural transition. Bridging this gap will require policy reform, economic support mechanisms, and a renewed cultural dialogue between farmers and citizens, capable of translating shared values into shared responsibility.

Based on the study's findings and their integration with other research, such as on climate adaptation and integrated nutrient management, several key recommendations emerge for advancing sustainable nutrient management. First, stronger political steering is needed to promote less intensive, more sustainable land use through supportive regulation and a favourable policy climate. Second, targeted transformations in farming systems—such as the strategic use of cover crops, introducing a pesticide levy to fund ecological measures, and the routine inspection of fertiliser application methods—can lead to tangible environmental benefits. Differentiating between phosphorus and nitrate strategies is also essential, as phosphorus reductions have advanced through feed reformulation, while nitrate loss mitigation still requires more focus on drainage and application practices. Lastly, creating robust incentive systems for nature conservation is vital; fair and reliable compensation for green services encourages farmer participation and helps unlock biodiversity potential across agricultural landscapes.

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6. Annexes

6.1. Annex I: Methodology

The study area is the Rhine River Basin, a key river leading into (and transporting nutrients) the Wadden Sea. The data for the analysis were collected through primary research, in interviews with farmers and surveys with citizens in Germany and the Netherlands.

To best serve the objective of the assignment of reporting on social Acceptance of innovative measures for reducing nutrient inputs into the Wadden Sea, the following methodology was applied in various stages:

6.2. Stage 1: Forming the Methodology

6.2.1. Screening literature and projects

In this step, potential similar work on social acceptability regarding environmental protection efforts or measures was checked, whether ongoing or completed. Here, we searched with the keywords *nutrient reduction social acceptance, measuring social acceptance environment, social acceptability environment, social acceptance farming practices, social acceptance agriculture, nutrient reduction measures, nutrient reduction measures EU, nutrient reduction measures Germany, nutrient reduction measures Netherlands, Nutrient pollutions Wadden Sea.*

Interesting information from project reports and research papers was collected to a) prepare the background section of this report, b) inform the narrative of the assignment (and later content of the surveys and interviews), and c) ensure a systematic collection of references for future use.

6.2.2. Setting the operational framework for the assignment:

- Defining which data is needed to assess social acceptance of nutrient reduction measures
- Defining the scope of the assignment in terms of the geographical distribution and data gathering techniques (decision to focus on the Rhine catchment and proceed with a combination of interviews and surveys)
- Building a clear narrative for the assignment will help create a coherent starting point when entering surveys and interviews.

During this step, an experienced company (Aproxima) was added to the project team, which helped with this step and the preparation and execution of the data collections (Steps 1.3, 1.4, and Stage 2) in Germany and the Netherlands.

In the Netherlands, NMi from the consortium has advised on the farmer interviews and executed them. Nmi also selected the postal codes to define the areas where the online survey was run in the Netherlands.

6.2.3. Designing the questionnaire for the farmers and surveys for citizens:

- Defining key inputs, we want to draw from the interviews and the surveys and set up categories (knowledge, meaning, expectations and behaviour) for structuring the data.
- Formulating questions for each target group based on the data we want to gather
- Making various loops within the project team to a) ensure precise question formulation and b) ensure only questions are asked where the data will be used.
- Finalising the interview catalogue for the interviewers, preparing the telephone survey and coding the online survey.[69]
- Translation of the interview guide to Dutch and checking with Dutch speakers to adapt to the Dutch context.
- Translation of the survey to Dutch.
- Briefing the interviewers.

[69] The survey question catalogue was developed coherently for two different channels: an online survey and telephone survey were prepared with the same content to ensure coherence across the different categories (knowledge, meaning, expectations and behavior). Only one block, containing questions on the perception on specific measures was altered slightly for the telephone survey for reasons of interview length.

6.2.4. Preparing the execution of the interviews and surveys

The interviews and surveys were run parallel from November 2024 to January 2025. First, the selection mode was arranged with Aproxima to ensure representation when selecting potential interview partners and to execute online and telephone surveys in the system. Thereafter, the contacting of farmers, scheduling of interviews, the process of data agreements and compensation for the time of the farmers in the Netherlands (in-kind present) and Germany (Gas-Voucher) were organised as compulsive tasks around the actual data gathering.

6.3. Stage 2: Data Collection

6.3.1. Interviews with farmers

In the interviews, individual farmers were asked about their general farming activities and prior knowledge, as well as their meaning, expectations, and behaviour on nutrient reduction measures. The interviews were conducted over the phone by one interviewer and a farmer and lasted around one hour each. After a few ‘’warm-up’’ general questions, different questions, follow-up questions and prompts were used to structure the interview. Please refer to Annex II for the Interview guide.

In Germany, two interviewees conducted 20 interviews in a semi-structured manner but ensured that all key questions were answered in each interview. Each interview lasted around 1 hour.

Once the interviewers were briefed and given access to the pool of interviews, they started to call farmers to make an appointment for the phone interviews. In this appointment phone call, the farmers provided some general information on their farming practices and status. If the farmers were immediately available for a more extended interview, the interviews took place right away. Farmers were informed about the first phone call via a letter inviting them to be interviewed and included basic information on the project. Twenty farmers were interviewed.

In the Netherlands, the farmers were contacted by a staff member of NMI. Some farmers had participated earlier projects of NMI, others were personal contacts. Farmers were chosen from different regions of the Netherlands, with varied age and type of farming. . After filling out a data agreement, the interviews were held at the farmers' kitchen table, always by the same colleague of NMI, who recorded the data by taking notes. This mode of interviewing was chosen to ensure that the farmers feel comfortable and free to share anything they have to say on the topic. Nine farmers were interviewed, and each interview lasted around 45 minutes.

6.3.2. Surveys with the citizens

In Germany, a combination of telephone and online surveys was selected. Participants were selected from the following group for Germany: Resident population aged 18 and over in the Rhine catchment area (defined by the client). The distribution between online and phone surveys was as follows:

- N=491 population sample according to ADM design (CATI)
- N=541 panellists quoted (online survey)

To ensure a survey length that respondents feel comfortable with, it was decided that one question from the phone survey was altered: In each phone survey, respondents were asked about the measures (Block: Experience). Which of the three measures they were asked about altered. Therefore, the German data sample is:

- N= 1032 (=491+541) for all other questions of the survey (combining telephone and online survey results)
- N= 705 (=541+164) per measure for the question block on specific measures (combining telephone and online survey results)

In the Netherlands, an online survey was conducted. Participants were selected from the following group for the Netherlands: Residents aged 18 and over in the Rhine catchment area of the Netherlands (Rijn West, Rijn Oost, Rijn Noord). The all-online respondents amounted to a data set of N=307 panellists quoted (online survey).

For the questions on the measures, the measures were defined as follows in the surveys:

Reducing livestock density was described in the surveys for the participants as follows: „Livestock density indicates how many animals are kept in a given area. More pasture farming and fewer animals kept in stables, while simultaneously reducing the number of animals on pasture, especially in cattle and pig fattening, reduces the production of nitrogen and nitrate, for example, through manure, which reduces nutrient pollution in rivers and the Wadden Sea. Agriculture should be required to implement this measure.“

Fertiliser management was described in the surveys for the participants as follows: „The moderate application of fertilisers to the soil by agriculture is intended to help reduce the amount of nitrogen and phosphorus entering the soil, groundwater, rivers, and ultimately the Wadden Sea. To this end, farmers are required to implement fertiliser management. This includes, among other things, specifications regarding when and how much fertiliser may be applied."

Widening buffer strips were described in the surveys for the participants as follows: „By creating natural protective strips such as meadows and shrub and tree plantations between river banks and agricultural land, the entry of fertilisers and manure into river waters is prevented. To achieve this, the area used for crop and livestock production must be reduced. Riparian buffer strips are already mandatory, but there is ongoing discussion about whether they should be widened."

6.3.3. Data availability

The raw data is available as follows:

For Germany:

- Anonymised, intelligent[70] transcripts (farmer interview output) in Word documents
- Anonymised quant. and qual. data (citizen survey output) in xls sheet
- Anonymised general information of farmers in PDFs
- Anonymised general information in the xls sheet

For the Netherlands:

- Anonymised notes from the kitchen table interviews with the farmers
- Anonymised quant. and qual. data (citizen survey output) in xls sheet

6.4. Stage 3: Data Analysis Process

The objective of the data analysis is to analyse all inputs from the citizens' surveys and interviews with the farmers to interpret the level of social acceptance of respective measures, highlight trends and wishes about nutrient reduction measures, and capture more general attitudes. This is done by analysing each data category (knowledge, meaning, expectations and behaviour) and checking for implications across the different blocks.

The data analysis took place from January to March 2025. The results of the qualitative and the quantitative analysis were studied together.

6.4.1. Qualitative data analysis

Inductive coding was applied to retrieve results from the primary data (interview transcripts). Coding qualitative data ensures a more systematic and rigorous data analysis in that it accurately represents participants' inputs, increases the validity of the results and decreases bias. [71]

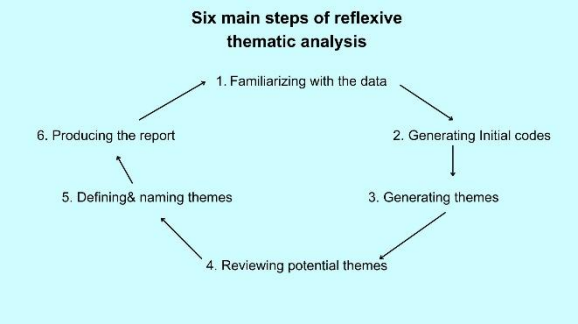
The following steps were followed:

a) The farmer interview transcripts were skimmed to check for trends and topics across the different categories.
b) Reflexive thematic analysis (Maguire& Delahunt, 1970) was chosen as the technique most suitable for the analysis because it allows for inductive coding along the process, where all interesting aspects from the interviews will be reflected in the analysis. We benefit from the iterative approach by going back to the data often and getting to know the data better and from different sides each time.

[70] Intelligent transcription: Transcribing every word, but making an interpretation to exclude pauses, status, and filler words and potentially cleaning up the grammar.

[71] Coding also provides transparency and reflexivity for the active researcher and anyone using the research, source (Delvetool, 2025).

The coding process is shown in the following figure:



Initially, the researcher reviewed one interview and noted all the codes and themes (Step 2+3). Parallel, the justification of the themes and any unexpected examples were pointed out in the memos. This process was repeated for five additional interviews. Next, the themes were structured more clearly, and the codes matched the themes. These themes were fixed for the analysis of the other interviews, but some additional codes were added to the themes during the interview analysis (Step 4+5). For reference, the coding book for the study is in Annex IV.

6.4.2. Quantitative data analysis

The citizen survey data, including socio-demographic values from the xls sheets, were processed, feeding into the categories that we selected to unlock social acceptance in this context:

- **Knowledge:** The state of knowledge and assessment of citizens concerning nutrient pollution, the extent of the pollution, its sources and how much respondents believe nutrients from rivers pollute the Wadden Sea.
- **Meaning:** An assessment of the effects of nutrient pollution and who it impacts.
- **Expectations:** An assessment of 3 measures (Usage of fertilisers, livestock density and width of buffer strips) based on the citizens' responses related to the sufficiency of each measure and the expected impacts. An indirect question on willingness to change consumption patterns is also required.
- **Behaviour:** An assessment of proposed changes between the political framework of the farmers' operations and the citizens' perspective. Also, responses on the willingness to reduce dairy and meat consumption are a survey item for checking expectations.

The data will be processed and visualised in different charts and tables. For most of the data, the visualisations will directly respond to the questions asked in the survey and will be embedded in the report. A few questions from the survey will be clustered and re-organised in the report for interpretation purposes. The following steps describe the exact procedure:

1. **Data Preparation**

The quantitative data is primary data from a questionnaire (filled either online via internet or through interviews via phone and/or directly), designed for citizens in Germany and in the Netherlands. 1032 respondents contributed data for Germany and 307 for the Netherlands.

Date cleaning and coding: Due to slightly different designs of the questionnaire in Germany and Netherlands '(e.g. political preferences were not asked in the Netherlands or codes for "I don't know" "I don't want to answer" were different for both countries) and due to differences between interviews and online questionnaires data needed to be homogenized and streamlined to provide comparable quantitative results for both countries and for both data collection methods (interviews or online).
For each answering option a numerical code was attributed and stored. However, not all codes were used in a consistent way for both countries, therefore these differences in codes or numerical values needed to be harmonised to enable a joint and comparable evaluation of data for both countries.

In total 14 answering options existed. For some questions there were only 2 options (i.e. binary answer Yes/no) and for others there were up to 10 options. For almost all questions there were the possibilities to select "I don't know" and "I don't want to answer". In some cases, especially for interviews there was also the option to exclude certain questions from the survey. This was mainly the case for questions concerning 3 different measures to combat eutrophication (questions 3.1 to 3.6). In Germany roughly 20% of answers to these questions are missing because they were not asked in the interviews.

2. **Variables and Measures**

There are no independent and dependant values in the survey because the purpose was not to analyse cause-effect relations but to get a consistent and comprehensive picture of citizens positions and opinions towards

eutrophication and their acceptance of countermeasures their view on responsibilities and their commitment to contribute.
For reasons of plausibility and credibility testing similar questions at different times in the interviews and at different locations in the online-questionnaires were asked to test for the consistency of answers but also to check the respondent's attention and preciseness in answering the questions. Online questionnaires who failed to pass the checks for attention and preciseness were excluded from the evaluation.

3. Statistical Techniques

For all questions and metadata a simple descriptive statistic was included as a first step. These simple statistics included counting, simple descriptors such as average, quantiles and frequencies, as well as grouping and joint evaluation of related questions and variables. These figures were calculated for each country separately as well as for all respondents in both countries jointly, in order to characterise or spot differences between nations. In all evaluations comparing Germany's and Netherland's relative values have been used (percentages) but for joint evaluations of both countries Germany has a "weight" of app. 1030 respondents and the Netherlands of about 300 respondents; no assumptions on the representativity for the national context were made or taken into account.

As a second step of data evaluation relations between all different variables were examined in order to detect significant correlations and/or collinearities. In some cases the coefficient of determination was used to describe the correlations.

No further statistical test have been applied because that would require ideas or assumptions on the subsample of the population that is included in the survey. Numbers were taken as they are and evaluated by reasoning.

Most evaluations, calculations and visualisation is based on MS- Excel, exempt the calculations and evaluations referring to the distance of respondents to the Wadden Sea. These calculations are based on an SQL database in combination with some Phyton routines and GIS vector shapes.

Grouping of respondents as well as aggregation of answers etc. is based on MS-Excel Pivot Tables. Almost all types of grouping or aggregation, the corresponding categories and criteria were tested for their robustness and stability. In other words, the results of different grouping rules and categories were compared and validated. No sophisticated statistical methods needed to be applied for this exercise as the results showed to be very stable and unsensitive to grouping and aggregation rules. Therefore simplification and aggregation was mainly driven by the intuitive clarity of the results, aiming at avoiding confusing complexity.

Handling of missing data: Missing data and/or unsignificant answers (such as "I don't know" or "I' undecided") were generally excluded from evaluation, also from those calculations where correlations between different answers to different questions were examined. Only complete datasets were included in calculations no assumptions on surrogates for missing values were used.

4. Presentation of Results

In general these are either simple univariate correlations between descriptors (displayed as X/Y graphs). Descriptors are either answers to single questions (such as "eutrophication concerns mainly … group A/B/C/D" or combinations of related answers (such as "less animal products/more vegetables", "more organic food", "more regional products" etc.).

Out of all evaluations and visualisations only the most significant have been included in this report. These are predominantly the following groups of questions and combined descriptors:

Question 3.9. a-c concern "willingness to change habits and take costs". 5 answering options were given (ranging in 5 steps from disagreement to full agreement) and coded with the numerical value of 1-5 for each of the three questions. The descriptor used in the summarising evaluation of all three questions was the average value of the codes assigned to the different answering options. Consequently the scale ranges from 1-5 corresponding to the degree of agreement. This descriptor was then tested for correlations with sort of "Meta-information" on the respondents, such as sex, political preferences, age, and income.

Questions 4.6.a-g concerned the description of environmentally conscious behaviour that respondents already have assumed or are trying to foster through their lifestyle. Among these, questions 4.6-a-d concern a) reduced consumption of animal products and increased consumption of vegetable and fruits, b) consume more regional products even if they are more expensive, c) take care not to waste perishables and d) pay attention to consume more organic food (even if it is more expensive). Only binary (Yes/No) answers to these questions were possible, and attributed the numerical value of 1 & 2. Evaluation of data did only take into account the aggregated value of all 4 answers, forming an (or displayed as) an indicator called "effel" meaning "Effort For an Ecological Lifestyle".

Further (second step) analysis included correlations with other data or Meta-data (similar to the above description for “willingness to change”), such as primary data like age/agegroup, income, education, sex, household size, political preference, distance to the Wadden Sea, number of children and classification/size of the settlement (BIK) but also relations between different aggregated or grouped indicators, such as “efel” and “willingness to change habits and take costs”

Questions 3.1-3.6 explored the opinion of respondents on the efficiency and effectiveness of measures to combat eutrophication caused by nutrient pollution (such as 1) buffer strips, 2) reduced animal husbandry and 3) fertiliser management) but also the general perception of already existing regulations, whether they are necessary, sufficient, or insufficient (need to be stricter). Also these questions have been analysed jointly as an aggregated indicator, consistently named “MN1-MN3” or “measure indicator” in the report and graphs.

6.5. Annex II: Interview Guide

Please note: The interview has been translated to English to insert in this report. The language is subject to translation differences, as the original versions used were only in German and Dutch.

Guidelines for the expert discussions

0	**Introduction:** (Introduction of the interviewer, mention of the topic, client, reference to the privacy policy, information about audio recording, request for consent.) **Warm Up: First, I would like to take some information about you and your company.** • What are your main business areas (plant production / animal production / both) • How many hectares (arable or pasture land) do you farm and how many animals do you keep? • Do you practice conventional or organic farming? • Do you sell your products domestically and internationally? If so, what is the percentage distribution? A rough estimate is enough for me. • How far are your company's production areas from the nearest watercourse (e.g. Rhine, Main, Neckar, Nahe, Moselle, Sieg, Lahn, Ruhr, Lippe, Vechte)?	**5 mins**
1.	**Key question 1 (informedness):** **To what extent are you following the discussion about reducing nutrient inputs from agriculture into rivers and ultimately into the Wadden Sea?** • What do you like about the discussion? • What do you dislike about it? • you see any direct connection between agricultural land use and the health of ecosystems such as the Wadden Sea? • What concerns do you have regarding the nutrient reduction requirements?	**10 min.**
2.	**Key question 2 (responsibility):** **In your opinion, what responsibility do farmers have for protecting our rivers and thus also the Wadden Sea?** • Which sectors and interest groups still need to be held accountable when it comes to measures to reduce nutrient inputs into river waters? • Who in our society bears the greatest responsibility for reducing the entry of nutrient pollutants into rivers and for what reason?	**15 min.**
3.	**Key question 3 (measures):**	**20 min.**

	What measures have you implemented to reduce your own nutrient losses (especially nitrogen and phosphorus) and what experiences have you had with them? Examples of measures that can be addressed: ▪ **Fertiliser management** to reduce nitrogen surplus and atmospheric losses, ▪ **lower livestock density** to reduce nutrient balances and atmospheric losses, ▪ **conservation tillage** to reduce soil erosion, such as the use of green manure or crop rotation, ▪ **Techniques** that reduce nitrate losses, such as crop rotation and minimal tillage, ▪ **Adjusting crop rotation including more catch/cover crops and undersowing** to reduce N surplus and soil erosion, ▪ **Water and riparian strips** for the retention of particles and dissolved nutrients. **Ask about their experiences!** • How will the success of this measure(s) be measured? • Are you practicing these measures because you have to, or are there other reasons for doing so? (e.g., adaptation to climate change = increased risk of erosion, crop failure, etc. => more erosion protection, increased hot days => cooling of stables too expensive => fewer livestock) • What do you see as obstacles to implementing such measures? • What do you need to be able to implement such measures? • Do you exchange information with others, e.g. about training or consulting services? • Is there enough political support to ensure the protection of watercourses in agriculture? • To what extent are such ecological measures and economic efficiency compatible in your company? • Are there any measures you are implementing that are not directly related to water protection but still have a positive impact on the waters? • Do you have any suggestions on how to achieve ecological and economic compatibility or even a good example from your practice?	
4 .	**Key question 4 (Expectations):** **The ecological restructuring of agriculture and livestock farming brings benefits to the population, such as long-term improvements in water quality, but also disadvantages, such as rising food prices. Do you think farmers will have the necessary public support if the ecological restructuring of agriculture and livestock farming continues? Are they encountering more understanding and support, or resistance?** • Which measures do you think are particularly popular with the majority of the population? • Which measures are most people rejecting? • If the general public were better informed that the ecological restructuring of agriculture and livestock farming serves to protect rivers and the Wadden Sea, would this increase people's acceptance of this?	**10 min.**
5.	**Key question 5: (Closing statement)** **What do you think: What could farmers and citizens do for each other to create a better mutual understanding of each other's perspectives on sustainable agriculture?**	**5 mins**

	Farewell: (Thanks and instructions for sending the incentive)	

6.6. Annex III: Survey

Please note: The survey has been translated to English to insert in this report. The language is subject to translation differences, as the original versions used were only in German and Dutch.

Population survey questionnaire (online/CATI)

1. Knowledge

Thank you for participating in our survey on the topic " Healthy waters, from the source to the sea – how can this be achieved? " The survey will take approximately 15 minutes. It is being conducted by Aproxima Gesellschaft für Markt- und Sozialforschung Weimar mbH. The survey is anonymous, meaning that the analysis and presentation of results will be carried out in such a way that no one can trace your personal details. Data protection regulations are strictly adhered to. You can read more about this here (link to the privacy policy).

Obtain consent from the test subjects here.

The survey explores the causes of water pollution and possible solutions for reducing it. We want to know your thoughts. The study is funded by the European Union's research program as part of the " NAPSEA " project . The project aims to support national and local authorities in selecting effective measures to reduce nutrient pollution in the Wadden Sea and its tributaries. It is also important to gather public opinion. We have prepared some questions for you.

1.1 In your opinion, what influence do the following factors have on the pollution of the water in the Rhine and its tributaries? Please name the three factors from the list below that you believe most contribute to water pollution.

The three factors with the strongest influence are:

Garbage from people staying near the water or illegal dumping of large quantities of garbage	O
Industrial wastewater	O
Agricultural wastewater, such as manure or digestate	O
Fertiliser residues that are not absorbed by the plants and seep into the soil, for example	O
Residues of pesticides from agriculture	O
Wastewater from sewage treatment plants in our cities and settlements	O
Wastewater and oil from shipping	O
Airborne emissions (e.g. heavy metals, ammonia)	O

1.2 Before taking this survey, had you ever heard, seen, or read about nutrients such as nitrogen and phosphorus being released into our rivers by agricultural crop and livestock production, destroying river ecosystems all the way to coastal waters?

Single nomination

Yes, in the last four weeks	O

Yes, in the last six months	O
Yes, more than half a year ago	O
That was a long time ago	O
I can't remember	O
No, never	O

1.3 Due to excessive nutrient inputs (especially nitrogen and phosphorus), rivers are at risk of becoming over-fertilized. They are then too nutrient-rich, which leads to excessive algae growth. This has a harmful effect on humans and many other living organisms, for example, when blue-green algae develop. How much do you estimate is the overall impact of this over-fertilization on the Rhine and its tributaries?

Only one answer is possible

heavily contaminated, i.e. significantly above the permissible limits	O
slightly loaded, i.e. slightly above the permissible limits	O
within the permissible limits	O
below the permissible limits	O

1.4 In the following question, we'd like to be a little more specific about the nutrient pollution of rivers. Certain sections of the Rhine and its tributaries are indeed polluted with nutrients such as nitrogen and phosphorus, which severely impairs water quality. There are various possible causes for this. We would like to know which of the following possible causes you consider to be the most likely.

Nutrient pollution of the Rhine and its tributaries …	applies	does not apply	I do not know
a) from industrial wastewater	o	o	o
b) through the way food is produced	o	o	o
c) because most people prefer to buy cheaper products from conventional agriculture rather than more expensive organic products	o	o	o
d) due to excessive animal production (cattle farming, pig fattening, sheep farming, poultry farming, etc.)	o	o	o
e) due to excessive crop production (e.g. grain, potatoes)	o	o	o
f) through forestry	o	o	o
g) through shipping on the rivers	o	o	o
h) through urban wastewater from the sewage treatment plants of our towns and villages	o	o	o
i) due to the consequences of global warming (e.g. more heavy rainfall, flooding)	o	o	o

1.5 The Rhine water flows into the Wadden Sea in the North Sea. What do you think is the negative impact of nutrient pollution on the flora and fauna in the Wadden Sea?

very large impact	O
major impact	O
partly/partly	O
low impact	O
no impact	O

2. Meaning

2.1 The over-fertilization of the Rhine and its tributaries causes an increased nutrient load (too many nutrients) of the Wadden Sea with negative consequences for the flora and fauna as well as the economic use by humans.

	not affected at all	rather not affected	Partly/partly	more likely to be affected	very affected
a) To what extent do you feel personally affected by these consequences?	o	o	o	o	o
b) To what extent do you think the people living in the Wadden Sea are affected by these consequences?	o	o	o	o	o
c) To what extent do you think the German economy is affected by these consequences?	o	o	o	o	o
d) To what extent do you think future generations will be affected by these consequences?	o	o	o	o	o

2.2 What impact do you think the nutrient pollution of the Wadden Sea has on you personally?

	negative effects	positive effects	as well as	neither nor
a) Effects on your health	o	o	o	o
b) Impact on your cost of living	o	o	o	o
c) Impact on your choice of holiday destinations	o	o	o	o
d) Impacts on the landscape and biodiversity in your region	o	o	o	o

3. Expectations

Various measures are necessary to reduce nutrient pollution in the Rhine, its tributaries, and the Wadden Sea. We will now present some of them and ask for your feedback.

3.1 Measure 1: Nutrient reduction through fertiliser management

The moderate application of fertilisers to the soil by agriculture is intended to help reduce nitrogen and phosphorus leaching into the soil, groundwater, rivers, and ultimately the Wadden Sea. To this end, farmers are required to implement fertiliser management. This includes, among other things, specifications regarding when and how much fertiliser may be applied.

What do you think: do these measures go too far for agriculture, are they sufficient, or do you think they do not go far enough?

The measures …	
go too far	o
are sufficient	o
don't go far enough	o
I can't judge that	o

3.2 Let's assume that stricter mandatory measures for nutrient reduction through fertiliser management were imposed on farmers. What do you expect to happen as a result of stricter regulations?

	I very much expect	I rather expect	partly/partly	I don't expect	I don't expect it at all

a)	There will not be enough funding to support farmers in converting their operations.	o	o	o	o	o
b)	The financial burden on farmers will increase as a result of the transition to sustainable production methods.	o	o	o	o	o
c)	The administrative burden for farmers will increase.	o	o	o	o	o
d)	Agricultural land will likely require more space for production with less fertilization.	o	o	o	o	o
e)	The necessary controls to enforce the measures will be lacking.	o	o	o	o	o
f)	The nutrient pollution of rivers and the Wadden Sea is reduced.	o	o	o	o	o
g)	Biodiversity in and around the rivers is strengthened.	o	o	o	o	o

3.3 Measure 2: Nutrient reduction by reducing livestock density

Livestock density indicates how many animals are kept on a given area. More grazing and less housing, while simultaneously reducing the number of animals on pasture, especially in cattle and pig fattening, reduces the production of nitrogen and nitrate, for example, from manure, which reduces nutrient pollution in rivers and the Wadden Sea. Agriculture should be required to implement this measure.

In your opinion, would such a mandatory measure for agriculture be unnecessary, sufficient, or does it not go far enough?

This measure would be … .	
unnecessary	o
sufficient	o
doesn't go far enough	o
I can't judge that	o

3.4 If farmers are required to reduce livestock density, what do you expect as a result of such a measure?

		I very much expect	I rather expect	partly/partly	I don't expect	I don't expect it at all
a)	There will not be enough funding to support farmers in converting their operations.	o	o	o	o	o

b)	The financial burden on farmers will increase as a result of the transition to sustainable production methods.	o	o	o	o	o
c)	The administrative burden for farmers will increase.	o	o	o	o	o
d)	Agricultural land will likely require more space for production with lower livestock density.	o	o	o	o	o
e)	The necessary controls to enforce the measures will be lacking.	o	o	o	o	o
f)	The nutrient pollution of rivers and the Wadden Sea is reduced.	o	o	o	o	o
g)	Biodiversity in and around the rivers is strengthened.	o	o	o	o	o

3.5 Measure 3: Nutrient reduction by widening riparian strips

By creating natural protective strips such as meadows and shrub and tree plantations between river banks and agricultural land, the entry of fertilisers and manure into river waters is prevented. This requires reducing the size of the areas used for crop and livestock production. Riparian buffer strips are already mandatory, but there is discussion about whether they should be widened.

In your opinion, would such a mandatory measure to widen riparian buffer zones for agriculture be unnecessary, sufficient, or does it not go far enough?

This measure would be … .	
unnecessary	o
sufficient	o
doesn't go far enough	o
I can't judge that	o

3.6 If farmers are required to reduce their cultivated land in order to create riparian zones, what do you expect to result from such a measure?

		I very much expect	I rather expect	partly/partly	I don't expect	I don't expect at all
a)	There will not be enough funding to support farmers in converting their operations.	o	o	o	o	o
b)	The financial burden on farmers will increase as a result of the	o	o	o	o	o

	transition to sustainable production methods.					
c)	The administrative burden for the affected farmers will increase.	o	o	o	o	o
d)	Agricultural land will likely require more space for production with wider riparian strips.	o	o	o	o	o
e)	The necessary controls to enforce the measures will be lacking.	o	o	o	o	o
f)	The nutrient pollution of rivers and the Wadden Sea could be drastically reduced.	o	o	o	o	o
g)	Biodiversity in and around the rivers is strengthened.	o	o	o	o	o

3.9 Restructuring agriculture with the goal of reducing nutrient pollution in rivers and the Wadden Sea can also have consequences for food consumers. When you think about your food consumption, what would you be willing to accept? Here are three suggestions. To what extent do you agree with them?

		strongly disagree	rather disagree	partly/partly	tend to agree	I completely agree
a)	I would consume fewer animal products (meat, sausage, eggs, milk).	o	o	o	o	o
b)	I would be willing to pay more for animal products (meat, sausage, eggs, milk).	o	o	o	o	o
c)	I would be willing to pay a fee for the necessary restructuring of agriculture.	o	o	o	o	o

4. Behave

At the end of our survey, we ask you to think about what you expect from politicians and other social forces and what you yourself are prepared to do to protect our waters.

4.1 What do you think: What could farmers and citizens do for each other to create a better mutual understanding of each other's perspectives on sustainable agriculture? Please complete the following sentence.

To achieve better mutual understanding:

I do not see any difference in perspective between the two regarding the design of sustainable agriculture	o
I can't answer the question	o

4.2 In your opinion, how should federal and state policymakers proceed to ensure that farms are converted so that they release fewer nutrients into soils and waterways? Here are three suggestions. Which one do you consider appropriate?

Single nomination

Politicians should impose more concrete and verifiable requirements on farmers and enforce them.	o
Politicians should impose requirements on companies and at the same time provide sufficient state funding as an incentive to restructure them.	o
Politics should not intervene in a controlling manner, but should leave the ecological restructuring of agriculture to the mechanisms of the market (supply and demand).	o
I can't decide between any of these suggestions.	o

4.3 Now we would like to know whether you use cow's milk or plant-based milk (e.g. from oats, soy or other plant-based substances) in your household?

Single name!

a) cow's milk	o
b) plant-based milk	o

c)	Both	o
d)	Neither cow's milk nor plant-based milk	o

4.4 **If 4.3 a or c is checked: Currently, a litre of cow's milk costs about €1.10 at discount stores. Would you be willing to buy the same amount of milk for a higher price if it meant fewer nutrients were released into waterways?**

Single name!

a)	Yes, I would be willing to do that, but it depends on the price.	o
b)	No, I wouldn't be willing to do that and would probably buy less milk.	o
c)	No, I am not willing and would probably switch to cheaper alternative products.	o
d)	I am undecided.	o

4.5 **If 4.4 a is ticked: How much would you be willing to pay for a litre of cow's milk?**

Single nomination

I would spend up to € 1.40 per litre of milk.	o
I would spend up to € 1.80 per litre of milk.	o
I would spend up to € 2.50 per litre of milk.	o
I would spend more than € 2.50 per litre of milk.	o

4.6 **Which of the following behaviours have you observed in yourself in recent years?**

Multiple mentions!

I have reduced my meat consumption and eat more vegetables and fruit.	o
I buy more regional products than before, even though they are sometimes more expensive.	o
Today, I pay more attention than before to ensuring that no food is thrown away.	o
Today, I pay more attention than before to ensuring that the products I buy are organic.	o

I look for good deals more often now than I used to.	o
I no longer drink tap water; I buy it at the supermarket.	o
I now only use drinking water from the tap if I have boiled it or filtered it.	o

5. Sociodemographics

5.1 In what year were you born?

_____

5.2 What gender are you?

o1 masculine
o2 female
o3 diverse

5.3 How many people live in your household, including yourself ?

o1 I live alone
o2 Total 2 people
o3 Total 3 people
o4 Total 4 people
o5 more than 4 people

5.4 Only if 5.3 is greater than 1: Do you have children under 18 years of age living in your household?

o1 Yes
o2 no

5.5 What qualification did you receive when you left general education school?

o1 School education not yet completed
o2 Leaving school without a degree
o3 Completion of 8th grade (elementary school, secondary school, polytechnic high school)
o4 Completion of 9th grade (secondary school, middle school)
o5 Completion of 10th grade (polytechnic high school, secondary school)
o6 Abitur (extended secondary school, high school)

5.6	**For our study, it's important to know the total monthly net income of your household (i.e., after taxes and social security contributions have been deducted). A rough estimate is sufficient for this. Please add together all wages, salaries, pensions, and other income of the people living in the household.**

- o under 500 €
- o 500 to under 900 €
- o 900 to under 1,700 €
- o 1,700 to under 2,000 €
- o 2,000 to under 2,600 €
- o 2,600 to under 3,200 €
- o € 3,200 to under € 5,000
- o € 5,000 and more

5.7	**Let's assume there were federal elections next Sunday: Which party would you vote for?**

- o AfD (Alternative for Germany)
- o Alliance 90/The Greens
- o BSW (Sarah Wagenknecht Alliance)
- o CDU/CSU (Christian Democratic Union / Christian Social Union)
- o The Left
- o FDP (Free Democratic Party)
- o SPD (Social Democratic Party of Germany)
- o another party
- o would not vote
- o I am not eligible to vote
- o know / undecided

Local size class (supplemented by the online/CATI system)

6.7. Annex IV: Codebook

6.7.1. Code System

1 General Parameters	0
1.1 distance river	24
1.2 income and time	4
1.3 main business	35
1.4 organic/ conventional	25
1.5 production areas	26
1.6 sale area	30
2 Active participation in the Nutrient reduction discussion	0

2.1 active participation	28
2.2 neg. aspects of discussion	20
2.3 pos. aspects of discussion	8
2.4 opinions on the discussion	19
3 Perception ecological responsibility	0
3.1 nature responsibility	4
3.2 river responsibility	23
3.3 Wadden Sea	21
4 Compatibility ecology	3
4.1 it's complicated	17
4.2 needs for synergies	4
4.3 possible/ already well synergized	10
5 Agricultural experience	0
5.1 agricultural challenges	12
5.1.1 climate change	7
5.2 exchange and learning together	40
5.3 family tradition	6
5.4 finances/Inflation pressure	7
5.5 monitoring, measuring success and adapting the nutrients	14
5.6 overwhelm/ capacity issue	9
5.7 externalities (steering)	13
6 Responsibility attribution	0
6.1 cheap price focus of consumers	20
6.2 consumer empathy	31
6.3 farmer assessment of social acceptance	29
6.4 (other) responsible actors	50
6.5 powerful players	3
6.6 rant	13
7 Attitudes towards regulation	4
7.1 attitudes authorities	31
7.2 flexibility of regulations	14
7.3 proportionality	30
7.3.1 plausibility/traceability/arbitrariness	13
8 Beliefs and sentiments	0
8.1 comparative ecol. cost or foreign products	13
8.2 food security narrative	2
8.3 left alone	10
9 Current measures	26
9.1 mandatory measures	15
9.2 own/ voluntary measures	35

9.3 specific measures	8
9.4 win win measure for rivers	10
10 Motivation to reduce fertilisers	3
10.1 agriculturally professionally driven	33
10.2 ecologically driven	10
10.3 economically driven	10
11 Future needs or wishes	10
11.1 enabling ideas for implementation	35
11.2 exchange citizens and farmers	42
11.3 follow the farmer	11
11.4 what citizens should do	9
11.5 what farmers should do	14
11.6 what politics should do	77
11.6.1 effects media and education	7
12 General observations	3
12.1 agr. historical growth	43
12.2 uncategorized observations	26

6.7.2. Code Descriptions

1 General Parameters
The code >General parameters< contains general information on the socio-economic background of the the farmer and some parameters on the farm.
-The code was matched with the additional phone-based information, that the interviewers gathered in the first step.-

1.1 distance river
distance to the nearest river

1.2 income and time
whether the farmer has his main income from this job and how much time they spend proportionally (part-time/ full time) as farmer

1.3 main business
main business in terms of produce or products (what the farmer produces)

1.4 organic/ conventional
statement on whether it is organic or conventional farming

1.5 production areas
location of the production areas/ fields: are they consecutive or spread out in different compartments?

1.6 sale area
where the produce is sold: domestic, abroad or mixed

2 Active participation in the Nutrient reduction discussion
The code >Participation in the Nutrient reduction discussion< includes all responses regarding the interview questions on how involved/ aware the farmers are in the nutrient discussion, what they like and dislike about the discussion.

2.1 active participation
Y/ N statement in terms of active participation in the discussion

2.2 neg. aspects of discussion
negative aspects of the discussion

2.3 pos. aspects of discussion
positive aspects of the discussion

2.4 opinions on the discussion
actively shared opinions (pos and neg.) on the discussion

3 Perception ecological responsibility
The code >Perception ecological responsibility< presents all comments related to the responsibility the farmers state they have for: nature in general, river ways, and/ or the Wadden Sea.

3.1 nature responsibility
how farmers see their responsibility towards nature and ecology

3.2 river responsibility
how farmers view their responsibility towards rivers

3.3 Wadden Sea
how farmers see their responsibility towards the Wadden sea

4 Compatibility ecologyXeconomy
The code >Compatibility ecologyXeconomy< captures all comments on what is, and could be done to farm in an ecologically sound way (by reducing nutrients for rivers) while/ instead of farming economically profitable -careful-here, partially some interview questions pre-framed this topic as a trade-off in quite a stereotypical way in that we equate ecological farming to nutrient reduction and protecting freshwater, and in that the trade off is always that there is a higher economic cost if nutrients are reduced-

4.1 it's complicated
comments on what is complicated about the balance of economic and ecologic compatibility when it comes to producing more environmental friendly (in this case) using less nutrients and being economically viable.

4.2 needs for synergies
ideas/ comments on what would be necessary for strong compatibility

4.3 possible/ already well synergized
comments on that it's already well synergized or possible

5 Agricultural experience
The code >Agricultural experience< captures day-to-day observations of the farmers, challenges they face, what kind of exchange fora they visit, and what kind of pressures they face.

5.1 agricultural challenges
comments on challenges in agricultural practices, things the farms or farmers struggle with

5.1.1 climate change
Problem of heavy rain, drought and climate change adaptation needs

5.2 exchange and learning together
to what extent do the farmers join group activities for advanced trainings and/ or exchange with other farmers

5.3 family tradition
comments on how farming is family tradition and/ or duty of passing on tradition

5.4 finances/Inflation pressure
comments on overall high financial pressure+ high inflation increases financial pressure

5.5 monitoring, measuring success and adapting the nutrients
replies on the question of how the farmers would measure success and monitor the measures

5.6 overwhelm/ capacity issue
comments on how overwhelmed the farmers feel and/ or have a lack of capacities

-these comments can link with some statements in the codes on attitudes towards regulation, such as proportionality etc.-

5.7 externalities (steering)
comments under this code relate to who actually carries the cost- according to the farmers- and how the current situation is steering and how things could be steered differently.

6 Responsibility attribution
The code >Responsibility attribution< shows what and who is the problem, and/ or is negatively affecting the farming situation in DE and NL.

6.1 cheap price focus of consumers
how for consumers the issue of good food, soil, water is not important enough for them to pay more for produce that is produces with less fertiliser

6.2 consumer empathy
empathy and support of the citizens, regarding the farming practices. appreciation for farming practices and produce and/ or criticism of consumers

6.3 farmer assessment of social acceptance
what farmers they say is the level of social acceptance of consumers, for measures or different farming practices overall

6.4 (other) responsible actors
comments on different actors that farmers deem responsible

6.5 powerful players
power of (pesticide) corporations, lobbies and other (EU) players

6.6 rant
all complaining, blaming, angry comments

7 Attitudes towards regulation
The code >Attitudes towards regulation< captures attitudes on
a) regulations: their proportionality, flexibility and how logical they are for farmers
b) authorities

7.1 attitudes authorities
attitude towards authorities and their controls

7.2 flexibility of regulations
comments on flexibility of regulations

7.3 proportionality
comments on how (compared to other measures, decisions, processes) the farmers perceive the logic of the measures

7.3.1 plausibility/traceability/arbitrariness
Nachvollziehbarkeit: traceability and possibility to understand why the regulations are the way they are

8 Beliefs and sentiments
The code >values and sentiments< captures comments, mainly beliefs and narratives around negative developments (perceived favouring of foreign products and the social and environmental impact of this trend) and the narrative of how the way the food system is developing is not sustainable (and disadvantages the farmers). The code also included are partially anxious/ feeling left out/angry sentiments.

8.1 comparative ecol. cost or foreign products
comments criticizing that there are no mechanisms in place to guide consumers to the regional products. The water, CO2 and environmental impact/ footprint and water pollution of imported products is sometimes much higher, but people still buy them if it is cheaper. This code also captures comments on general value questions as

to deciding for import more and not caring about the consequences and basically shutting down German production for the sake of price, but not caring about neg. externalities and dependency.

8.2 food security narrative
concern about production feasibility with regard to food security: captures those comments that stress that in order to feed the population, that only certain farming techniques and ways of producing can feed the masses

8.3 left alone
this code includes comments on feeling left out, but also when the farmers are feeling pushed in a corner and have to justify too much

9 Current measures
The code >Current measures< includes all comments made on measures that already exist,: specific measures, mandatory and voluntary ones, and those, that were initially not targeted at reducing nutrient, but also help with this.

9.1 mandatory measures
comments on those measures that are mandator

9.2 own/ voluntary measures
comments on those measures that are voluntary and/or that farmers developed themselves

9.3 specific measures
concrete measures proposals for nutrient reduction

9.4 win win measure for rivers
measures or practices that are done for any reason (not specifically for nutrient reduction) but that have positive effects on river health

10 Motivation to reduce fertilisers
The code >Motivation to reduce fertilisers< captures the comments if the main motivation behind reducing nutrients stems from ecological convictions, economic reasons, or because of farming experience and professionalism.
-note, of course, several farmers can have more than one motivation-

10.1 agriculturally professionally driven
agricultural logic and professionalism within the job: fertilizing as needed only

10.2 ecologically driven
ecological (or value) incentive or motivation to reduce nutrient use

10.3 economically driven
economically motivated to reduce fertilisers

11 Future needs or wishes
The code >Future needs or wishes< includes ideas from the farmers as to
a) what the following groups must improve: politicians, farmers, citizens
b) what would help to strengthen the exchange between farmers and citizens
c) what they know that should be taken into account more
d) enablers for measure- implementation

11.1 enabling ideas for implementation
collection of systematic changes and/or processes that would support the implementation of measures and/ or ideas that relate to enhancing the knowledge, acceptability with consumers, or the exchange with them.

11.2 exchange citizens and farmers
comments on what farmers believe would help the citizen farmer interaction

11.3 follow the farmer
trust and follow recommendations of the farmers when planning and issuing regulations, but also leave more flexibility

11.4 what citizens should do
what citizens should do (to enable nutrient reduction)

11.5 what farmers should do
what farmers should do (to enable nutrient reduction)

11.6 what politics should do
what politics should do (to enable nutrient reduction)

11.6.1 effects media and education
Any comments on the role of media and education

12 General observations
comments on the historical development of agriculture, or miscellaneous comments, see sub-codes

12.1 agr. historical growth
historical development and problems with regulations/Agricultural policy developments from the perspective of farmers, partially also causal effects that the farmers see

12.2 uncategorized observations
miscellaneous observations

6.8. ANNEX V: Party affiliation effects on willingness to change(Additional result)

In the survey, participants were also asked who they would vote for if there were elections that week (December 10th- 15th, 2025) and plotted it against the statements of willingness to change. Please note, that the party affiliation is only available for Germany.

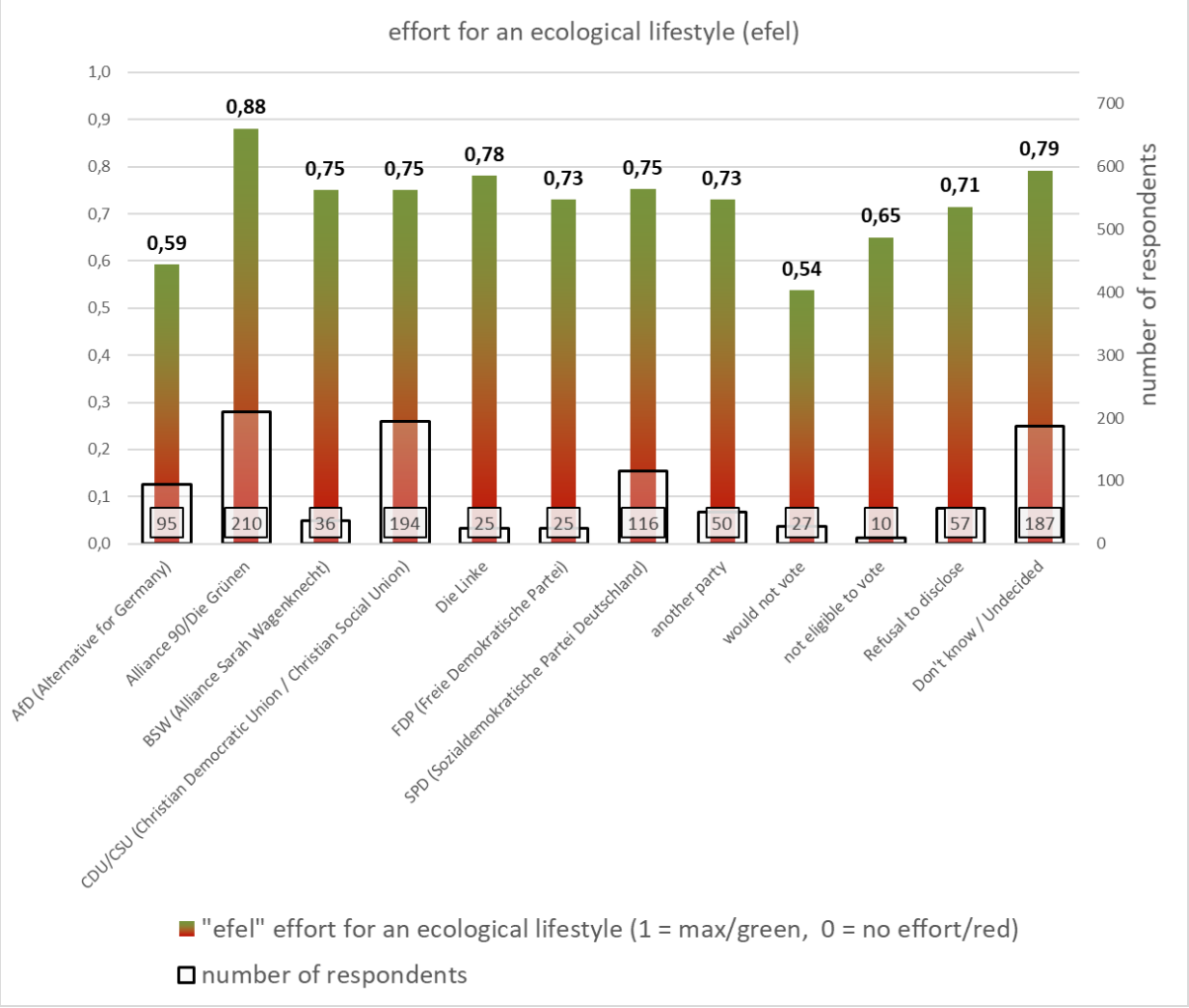


Figure 21: Current efforts favourable for nutrient reduction: Party preference comparison

Figure 18 illustrates the effort for an ecological lifestyle (efel) among respondents, categorized by their political party preference or voting intention. The ‘‘feel’’ score ranges from 0, indicating no effort, to 1, representing maximum effort. In addition, the number of respondents in each group is shown. The results reveal substantial variation across political affiliations. Supporters of Alliance 90/The Greens report the highest ecological lifestyle effort with an average score of 0.88, based on 210 respondents. By contrast, the lowest effort is observed among those who indicated they would not vote, with an average score of 0.54 from 27 respondents. Relatively high efforts are also reported by supporters of Die Linke, with a score of 0.78 from 25 respondents, and by those who were undecided or did not know their voting preference, who reported a score of 0.79 from 187 respondents. Respondents supporting the SPD scored 0.75, while those favouring the CDU/CSU and the FDP reported scores of 0.75 and 0.73, respectively. In comparison, AfD supporters demonstrated a markedly lower level of ecological effort, averaging 0.59. Those who refused to disclose their voting preference scored 0.65, and individuals not eligible to vote reported an average of 0.71. Overall, the data suggest a clear link between political orientation and the extent of effort dedicated to maintaining an ecological lifestyle, with Green Party supporters demonstrating the strongest ecological commitment and non-voters showing the least.