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# Why are ecological problems increasing when corporate sustainability practices are significantly growing?

*A planetary boundaries perspective of the Swedish food retail market's sustainability reporting*

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## **Abstract**

**Background and Problem:** The environmental debate has increased in society for the last couple of years and the main focus has been on climate change and carbon dioxide emissions. The concern has led to an increase of sustainability practices among companies and new directives from policymakers. Despite the increased concern, the status of earth systems are still worsening. The alarming status has been described in the research about planetary boundaries.

**Purpose:** The purpose of this research is to receive a better understanding of what improvements are necessary in order to achieve better ecological sustainability in the Swedish food retail market. More specifically, the research aims to examine to what extent the two planetary boundaries *biosphere integrity* and *biogeochemical flows* are integrated in the selected companies ecological sustainability information.

**Method and Theory:** The sustainability reports and the alternative sources were analysed through the consolidated interrogation model (CONI), which combines both the quantitative and the qualitative method. The two theories, impression management and stakeholder theory, are presented to explain underlying forces affecting the companies' operation. Information about sustainability reporting, the Swedish law and the Global Reporting Initiative, are included to provide background information about mandatory demands and voluntary guidelines. Lastly, previous research is presented to provide the reader with an overview of earlier findings concerning the topic of the planetary boundaries.

**Findings:** The quantitative results show that all companies cover at least one of the two planetary boundaries to some extent. The qualitative results indicate that there is a lack of numeric measurements and to some extent a lack of explanatory descriptions of the boundaries. The two examined boundaries are not considered to be cared for in a reasonable proportion to the food industry's severe and alarming impacts, especially when comparing findings between the two boundaries and the alternative category climate change. The results can be explained by what the media highlights, since such information leads to what is considered to be general knowledge concerning ecological issues. If it is considered general knowledge, the possibility that stakeholders will put pressure on the companies to act on the matter increases. Furthermore, the findings show that sustainability information can be presented in a favorable way that influences stakeholders perception of corporate sustainability achievements.

**Key words:** Food industry, Planetary boundaries, Ecological limits, Sustainability reporting, Swedish food retail market.

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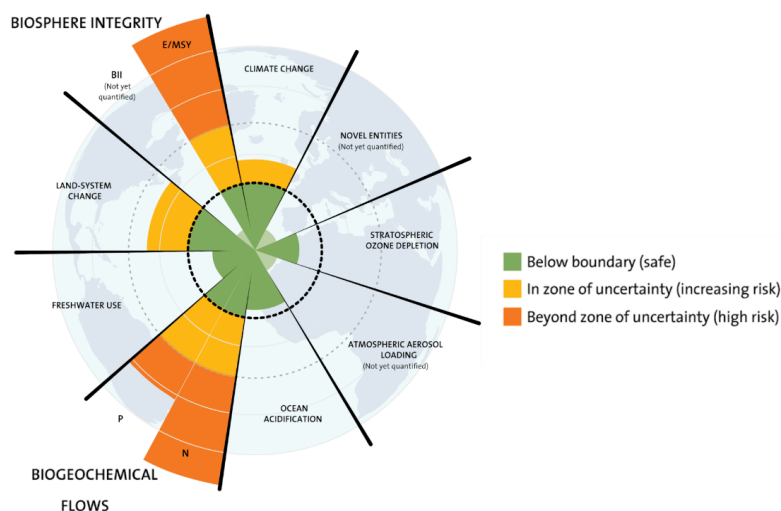
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# 1. Introduction

*/The first chapter of the thesis introduces the planetary boundaries, provides background information about the chosen industry and briefly explains sustainability reporting. The background section is followed by a problem analysis which leads to the purpose of the research as well as stating the research question./*

## 1.1 Background

In recent years, the environmental debate has for the most part been focusing on carbon dioxide emissions (CO<sub>2</sub>), global warming and with that the emergent effects of climate change. Although concern regarding climate change is vital for a sustainable planet, other urgent threats might have ended up in the shadows. In 2009, the research about the nine planetary boundaries, developed by Johan Rockström and his team of 28 internationally well known scientists, was published at Stockholm resilience center (Rockström et al, 2009). The planetary boundaries describe different environmental issues and the limits regarding what the planet can manage in each field, before unmanageable environmental effects may occur. Four of the nine boundaries have already exceeded the limits, where the limits are presented as a dotted circle in Figure 1. Climate change and land system change are in the same risk zone of exceedance, presented in yellow. However, *biosphere integrity* and *biogeochemical flows* are far worse off, currently at the high-risk zone in orange. The changes are mainly driven by human activities connected to the increasing demand for food, water and natural resources, where the food industry and its agricultural processes are key factors.



*Figure 1. Own elaboration of the Planetary boundaries Illustration with minor edits. Credit: J. Lokrantz/Azote based on Steffen et al. (Stockholm Resilience Centre, 2015)*

The research of the planetary boundaries originates from Sweden, but the country itself is not highlighted in particular, since the research presents a global perspective (Rockström et al, 2009). Although, in a study aiming to view nationalities separately, Sweden was presented as a country which had a high number of exceeded ecological limits, where 6/7 of them were transgressed (O'Neill; Fanning & Lamb, 2018). Due to the fact that the research originates from Sweden as well as the findings of O'Neill; Fanning & Lambs (2018), an interest arose to study the country's food industry, in accordance with Rockström et als (2009) arguments of its severe impact. As for inclusion of the global perspective, Sweden was considered relevant since around half of the food consumed in the country is imported (Jonasson, 2018). Due to this fact, the ecological footprint from Swedish food consumption is not merely connected to Sweden but also impacts on a global scale.

Concerning sustainability commitments, Sweden was the first country in 2009 to announce that all 55 state owned companies had to publish a sustainability report each year according to the Global Reporting Initiative (GRI) (Management of Environmental Quality, 2008). A few years later in 2016, Sweden regulated the law of annual account acts (1995:1554) and added that *all* large companies, under certain criterias, must report their sustainability work (FAR, 2021). As for the Swedish food industry, the five biggest companies in the Swedish food retail market account for approximately 90 percent of the total market share and are all obligated to report according to the law (The Swedish Food Retailers Federation, 2021). However, in the law (1995:1554) it is not defined and clarified which essential parts should be included in the sustainability report regarding ecological issues. Therefore it is open for interpretation and may differ between companies (The Confederation of Swedish Enterprise, 2021). Hence, the design of the sustainability report can vary, but the same system as state owned companies use, GRI, is a commonly used method in the industry (Swedish Trade Federation, 2016).

Previous research of the Swedish food retail market connected to sustainability reporting has been conducted (Idmark & Berghlund, 2019). The research focused on the customer perspective, considering if the companies in the Swedish food retail market manages to meet the customers demand for sustainability in their sustainability reporting. Their research showed that the companies succeeded in that aspect. However, a problem occurs if the demand from customers in the area of sustainability reporting and corporate responsibility are not the same as the most severe environmental effects from their operation.

## 1.2 Problem analysis

Research within the field of corporate sustainability has increased during recent years. However, among these studies there are still relatively few focusing on what role companies and industries have regarding care for the planetary boundaries (Whiteman et al, 2013). The food industry and its agricultural processes are key factors which have contributed to the alarming statuses of the most exceeded boundaries, *biosphere integrity* and *biogeochemical flows*. The former can be connected to biodiversity loss and the latter to changes in the cycles of phosphorus (P) and nitrogen (N)<sup>1</sup>. With regards to the challenges with biosphere integrity, one main global issue relates to species that are threatened to extinction. Research shows that out of 28 000 threatened species, 24 000 of them can be connected to agricultural and aquacultural practises (Ritchie and Roser, 2020). As for biogeochemical flows, phosphorus and nitrogen are used as fertilisers to enhance plant growth. The main damages caused by the nutrients are related to leakages from agricultural practises into vulnerable surrounding ecosystems.

The current status of biosphere integrity and biogeochemical flows are leading to disordered ecosystems and are hence threatening the important *ecosystem services*<sup>2</sup> provided by the planet. Ecosystem services are provided by natural functions in nature, and the services benefit people and their wellbeing. Ecosystem services contribute to the food industry, where consequently, if biodiversity continues to decrease, functioning food production and even conditions for life on the planet is endangered (Stockholm Resilience Centre, 2015). Moreover, related to the expected growth in population where an increase of global food demand is anticipated, even further challenges await (Conjin et al, 2018). The potentially unmanageable environmental consequences that can follow, connected to the alarming statuses of these passed thresholds, can be understood by the phenomena *feedback loops*. Climate feedback loops are processes that either increase or decrease effects caused by climate forcings. These so-called forcings can for instance be emissions. It means that the initial climate factor, for example said emissions, leads to a repetitive chain reaction that either weakens or strengthens the initial climate factor (emissions) and its effect. In a situation when the reaction strengthens, it is called a positive feedback loop. The *positive feedback loop* is the problematic phenomena relevant in this research. Positive feedback loops can cause cascade effects, where the responses accelerate in ongoing chain reactions.

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<sup>1</sup> See further explanation of the three scientific concepts (biodiversity, phosphorus and nitrogen) in Appendix 1

<sup>2</sup> See further explanation of the scientific concept in Appendix 1



After a certain stage of positive feedback loops, the earth systems can reach a “tipping point”, at which unpredictable, irreversible and chaotic environmental changes can be triggered. (The Climate Reality Programme, 2021). Transgressing planetary boundaries is thus a dangerous and serious matter, which is why environmental limits are vital to carefully consider. (Rockström et al, 2009)

As far as companies are concerned, research has shown that ecological limits are rarely presented in their sustainability reports, despite the relevance of the matter (Bjørn et al, 2017). Further critique is raised concerning that even if ecological concerns are mentioned, the information is often rather general. In a research that studied 40 000 companies within different industries and countries, the only industry taking any specific action in order to address the challenges with ecological limits was the high-tech industry. In accordance with Bjørn et al’s research (2017), the food industry’s actions concerning sustainability matters seem to be rather modest, regardless of the severe impact agricultural processes have on *biosphere integrity* and *biogeochemical flows*.

The following section turns from a global perspective to the Swedish food market. The key actors of the Swedish food retail market are Axfood AB, Bergendahls Food AB, Coop Sverige AB, ICA Sverige AB, Lidl Sverige KB. These companies account for approximately 90 percent of the Swedish market share, a number which comes with large responsibility and power (The Swedish Food Retailers Federation, 2021). The legal demand for these companies to report their sustainability work increased with the new law implemented in 2016, where a section including ecological concern is mandatory. However, even though the law notices the importance to address sustainability, the description presented related to ecological concern is rather vague and open for interpretation by the companies. Consequently, companies do not legally have to be transparent and report on both the positive aspects as well as the negative ones concerning ecological issues (Haffar & sperecy, 2020). Due to this, additional factors affect how companies report and work with ecological sustainability. Firstly, it is difficult to be aware and take responsibility for all ecological impact in the supply chain since the Swedish food retail industry imports almost half of the food that is sold. Secondly, even if the companies are aware of their operations impact, it is not certain they will present this transparently. In other words, information published in sustainability reports can be presented in a way that can be perceived as responsible in the eyes of the company's stakeholders, even though it does not necessarily reduce the ecological

impacts caused by their operations (Michelon. et al, 2016). With that being said, there is a risk that sustainability reporting is used as a tool to increase legitimacy and improve the public image instead of presenting and acting on relevant environmental issues related to companies operations.

In conclusion, there seems to be a disconnection between presented ecological concerns and ecological problems. On the one hand, society experiences more and more corporate sustainability practices and higher legal requirements on reporting. On the other hand ecological issues still remain an increasing problem despite these efforts. Whiteman et al (2013) call for further research regarding companies' impact on the most urgent boundaries, which have passed their thresholds. The food industry with its significant impact on the two most exceeded planetary boundaries *biosphere integrity* and *biogeochemical flows* were thus chosen as a relevant industry to examine.

### **1.3 Purpose**

The purpose of this research is to receive a better understanding of what improvements are necessary in order to achieve better ecological sustainability in the Swedish food retail market. The research aims to examine to what extent biosphere integrity and biogeochemical flows are integrated in companies ecological sustainability work and hence in their publications on sustainability matters.

### **1.4 Research question**

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To what extent are the two planetary boundaries *biosphere integrity* and *biogeochemical flows* taken into consideration in the Swedish food retail market?

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## **1.5 Delimitations**

The assessment of choosing the planetary boundaries as framework for examining urgent ecological issues may affect the results and conclusions drawn. For instance, if having made the choice to use the potentially more commonly known Sustainable Development Goals (SDGs) as framework, the results may have shown different concern for ecological matters (United Nations, 2021). However, since the SDGs present a broader approach of sustainability, also including economic and social matters, further assessments would have needed to be made by the authors in order to limit the scope, in relation to the limitations of time when conducting the research. Even if only choosing the ecological SDGs, it is at first insight not as clear as the planetary boundaries which ecological matters that are most urgent. Due to an aim of limiting the scope to the scientifically proven most urgent environmental matters, where the authors own assessments do not affect the delimitations, the planetary boundaries seemed like the relevant choice for this research. Since the planetary boundaries framework was developed by 28 renowned scientists, it was viewed as a reliable framework suitable for this research.

## **2. Literature Review**

*/The literature review presents theories on sustainability reporting, legal demands and guidelines on reporting, previous research within the field and further detailed ecological information on the planetary boundaries./*

### **2.1 Theories on sustainability reporting**

*/The two theories, impression management and stakeholder theory were selected to possibly explain underlying forces affecting what the companies choose to present regarding their sustainability work./*

#### **2.1.1 Impression management**

In social psychology, impression management is when a person presents themselves in a way that they hope will be perceived as positive by others (Michelon. et al, 2016). In a company context, the theory is described as a set of actions taken by management to influence stakeholders' perception of corporate sustainability achievements. For example, a way of influencing can be to present goals regarding social, political or environmental matters that management wants stakeholders to believe is something they work with actively even though that is not the case. Another example can be commitments taken which can be perceived as sustainable or responsible, but are not connected to the organisation's core operations and the impacts it causes. The reason for companies to implement impression management is due to the fact that it can protect or improve their legitimacy and public image, and therefore it is similar to legitimacy theory. The difference however is that legitimacy theory is a way to make the society perceive the organisation as legitimate, while impression management is more considered as a strategy to manage stakeholders perception (Perkiss. et al, 2020).

#### **2.1.2 Stakeholder Theory**

An organization has various groups of stakeholders who put pressure on the organisation in how it addresses issues relating to social, environmental and economic matters. The *stakeholder theory* aims to identify these actors to increase the knowledge on what and who affects the organization's management's decisions (Jensen, 2002). Stakeholders can affect the wellbeing of the organisation, but also be affected by the organisation's business operations. Stakeholders can be both internal groups in the organization such as employees and owners or external groups as suppliers, Non Governmental Organizations or customers. Together

they constitute the network that the organisation is dependent on (Wicks et al, 1994). According to some interpretations of the theory, it can also include the environment as a stakeholder (Jensen, 2002).

Knowledge about corporate management theories can be useful for understanding stakeholders' possible reactions to different initiatives when managers make decisions. An argued problem with the *stakeholder theory* is however, if an organisation would take all their stakeholders into consideration, the theory can be difficult for managers to use for guidance in decision making. This is because the theory itself leaves no good criterias for problem solving in favor of all stakeholders. Without guidelines for problem solving, management can make decisions in self-interest, and follow the opinion of the stakeholder in their favor. This will be at the expense of society or the organisational finance, and the management will not be held responsible for their actions, since the theory does not leave clear guidelines. Furthermore, due to globalization and large supply chains, an organization can affect other actors apart from their own stakeholders, both in environmental- or social matters (Jensen & Sandström, 2011). The same article argues that companies whose operations have an impact on a global level today have a global social position that makes it necessary to demand a greater responsibility than what their stakeholder demands or what is legal in the matter.

Despite the criticism of the theory, the Swedish food retail industry and the actors it includes need to be able to answer to the demand from their stakeholders to a certain extent to keep their position on the market and maintain or improve their image perceived by society.

## **2.2 Sustainability reporting**

*/Sustainability reporting is a way for companies' to present non-financial information to stakeholders. How companies report sustainability matters can be affected by the European Directive and GRI./*

### **2.2.1 European Directive and the Swedish Law**

In 2014 the European Commission presented the new directive 2014/95 that aimed to increase the reporting of non-financial information and diversity disclosure in the corporate world (European Commission, 2021). Due to the directive, Sweden regulated their law of annual accounts act in 2016, and presented the criterias for which companies must report on non-financial information. If they fulfill two of these three criterias they are obligated to

report (The Confederation of Swedish Enterprise, 2021). Firstly the company has, or have had over 250 employees, secondly the total assets must be greater than 175 millions SEK and/or thirdly, the company has a net turnover greater than 350 millions SEK. All the actors in the Swedish food retail market fulfil these criterias. In the law (1995:1554) the description of what should be included in the non-financial part reads:

“It shall contain the sustainability information needed for the understanding of the company’s development, position and results and the consequences of their operations.”. (FAR, 2021)

More descriptive information on what should be presented regarding the ecological impacts caused by the company's business operation is not accounted for in the regulation of the Swedish law of annual accounts acts.

### **2.2.2. Global Reporting Initiative - Materiality Principle**

The aim for the Global Reporting Initiative (GRI) standards is to assist organisations report on their impacts concerning the environment, the economy and the society (Global Reporting, 2021). It is an independent, international organisation that provides standards for sustainability reporting in order for organisations to be compared and take responsibility for their impacts. However, the guidelines are voluntary for organisations to follow when reporting on non-financial matters, and GRI reporting standards do not demand any reviewing prior nor post publishing reports labeled with and referred to the GRI framework. GRI is giving 33 topic specific standards in the three categories: economy, environment or social where companies select and use the ones they choose significance for their business operations and the impact it causes. The selection should be based on the *material principles*, meaning that if a topic ranks highly in one of the two dimensions it is considered to be material, and should be included in the reports. The two material principles is presented by GRI as:

“(1) the significance of the organization’s economic, environmental, and social impacts – that is, their significance for the economy, environment or society, as per the definition of ‘impact’ – and (2) their substantive influence on the assessments and decisions of stakeholders.”. (Global Reporting, 2021)

According to the Global Reporting Initiative, impact is defined as the external effect that the organisation has on the three categories (environment, social and economic) and their sustainability development. Impact is in other words not defined by the effect it has on the organisation itself.

## **2.3 Previous Research**

*/The following section will initially present information regarding corporate sustainability with a planetary boundaries perspective, followed by research including the sustainability reporting point of view of the matter./*

### **2.3.1 Planetary boundaries and corporate sustainability**

A significant increase of studies in corporate sustainability practises has been observed during recent years, where companies' involvement in sustainability matters has grown alongside it. Previously, companies tended to use reactive approaches, whereas today it has progressed to a more proactive, strategic and integrated process. Despite this, ecological problems are also increasing (Whiteman et al, 2013). A research paper on the matter describes three problems related to this disconnection. **Firstly**, among the empirical studies, there are few which quantify and measure the impact companies have on the earth systems. Attention is instead often drawn to organizational, social and institutional fields of sustainability. Even though the information is valuable, it also creates a risk of illustrating the company in a way that does not fully describe the impacts connected to the corporation's operations. **Secondly**, due to the fact that ecological issues are interrelated and complex, there is a need for further research viewing a broad perspective and needed collective actions related to the issue. **Thirdly**, suggestions are made to integrate natural science into the corporate sustainability field, where ecological foundations for working with sustainability is recommended.

Due to these statements, *the planetary boundaries framework*, which was conducted within the natural research science field, could properly serve as a collective yardstick for corporations sustainability work and reporting. It gives increased awareness of ecological limits and enables measurement of global performance. Even though research on a broader level is called for, specific companies' and industries' impact can not be ignored. Instead,

impacts and actions especially related to urgent ecological matters, which can be connected to specific operations, are encouraged to be further considered. *The planetary boundaries framework* could help companies structure their strategic guidelines for ecological approaches. (Whiteman et al, 2013)

### **2.3.2 Planetary boundaries and sustainability reporting**

A previous study which researched 40 000 corporate sustainability reports with regard for ecological aspects found that five percent of them touched on ecological limits. Among them, the far most presented planetary boundary was climate change with the reference to the two degrees celsius goal. Of these companies, only a few described how they planned to address the challenges with potential changes in their operations. The primary industry, which used ecological limits as targets for specific adjustments, were high-tech companies. Implementation of ecological limits in corporations strategies and reporting is said to be challenging, however that is not an excuse for neglecting to address significant areas. The paper presents some recommendations in order for companies to take the limits seriously. There is a need to include other urgent limits apart from only addressing climate change. It is suggested that industries should choose to consider ecological boundaries which are especially significant within their fields. Related to the food industry, companies are encouraged to include the impacts of their supply chain to align ecological limits with agricultural impacts, such as deforestation and emissions from pesticides and fertilisers. Furthermore, considering potential changes of *how* things are produced is not enough, questions also need to be raised in regards to *what* is being produced and if that corresponds with meeting the needs of current and future generations. Reconsidering the economic systems and business models is needed, and even though it is a major thing to ask of companies and societies, the size of the challenge cannot serve as an excuse (Bjørn et al, 2017).

## **2.4 The Swedish food retail market**

*/The next section covers the perspective of retailers in the Swedish food industry and what barriers and drivers they experience concerning making the industry more sustainable. /*

As for the food retail market, Chkanikova and Mont (2012) present Swedish food retailers' point of view regarding barriers and drivers for food retailing in a sustainable way. Even



though efforts have been made, it is stated that environmental actions are still minor, unsystematic and fractured. Previously, the transition towards increased purchases of sustainable foods has commonly circulated around customers' choices and perspectives. However, according to Chkanikova and Mont (2012), customers mean that retailers have a responsibility to guide them towards the "right" options in the store. Proactive strategies, where sustainable food alternatives expand in the range of goods, might be the primary challenge to focus on. Drivers for these changes within retailers' supply chains are presented to primarily be legitimacy, power and urgency, where all three aspects can be connected to *stakeholder theory*, according to Chkanikova and Mont (2012). Barriers presented are the complex supply chains and the lack of resources, power and knowledge that individual retail companies have. Recommendations for increased responsibility in supply chains, suggested by the research, is partly to integrate further governmental initiatives where support for retailers can be given by policymakers. This would contribute with further incentives to transition towards a more sustainable supply chain. Furthermore, collaboration and alliances between retail companies are recommended, as well as ranking systems for sustainable products (Chkanikova & Mont, 2012).

## **2.5 Detailed information of the ecological problem**

*/For further knowledge about the two highlighted planetary boundaries in this research, more detailed information about the ecological problem is presented in the upcoming section. /*

### **2.5.1 Biosphere integrity**

The planetary boundary *Biosphere integrity* refers to biodiversity loss and with that the extinction of species (Rockström et al, 2009). *Biosphere integrity* is the planetary boundary which has been exceeded the most. The planetary boundary is however difficult to measure, and as shown in Figure 1, the boundary has not fully been quantified. However, despite the incomplete knowledge and limited measures, there is still enough evidence proving that the world is currently experiencing its sixth mass extinction event. The loss of biodiversity is threatening important *ecosystem services* (Rockström et al, 2009). One example of such a service, related to the food industry, is pollination (Gallai et al, 2009). In Europe, the vast maturity of all cultivated crops are dependent on pollination from insects and especially from bees. Despite this, there is evidence of a decline in both diversity and abundance amongst bees. Severe economic and environmental consequences may follow for the food industry

and its stakeholders if adequate pollination no longer exists (Gallai et al, 2009). The agricultural ecosystem services are vital for human wellbeing, where conditions for successful food production are one of the benefits provided. Apart from pollination, further examples of ecosystem services are maintenance of soil structure, biological pest control and nutrient cycling (Power, 2010). The situation with lost ecosystem services lowers the resilience to disturbances, which means that ecosystems are becoming more vulnerable (Rockström et al, 2009).

### **2.5.2 Biogeochemical flows**

Vulnerability in ecosystems can also be found with regard to *biogeochemical flows*, which is the second most exceeded planetary boundary. *Biogeochemical flows* concern changes in the cycles of nitrogen and phosphorus, where issues regarding both substances widely can be drawn to the food industry. Nitrogen and phosphorus are used as plant fertilizers to enhance plant growth in food production, however, the fertilizers rarely are fully absorbed by the crops, which leads to leachages. As for nitrogen, the chemical substance transfers from the soil into water areas by rainwater. The rainwater transports the substance to other unwanted locations, where it causes problems in mainly marine areas, partly related to eutrophication<sup>3</sup>. The global food system accounts for nine-tenths of the human related mobilisation of nitrogen (Bowles et al, 2019), causing large amounts of nitrogen to convert from the atmosphere into reactive forms (Rockström et al, 2009). As for phosphorus, it is in contrast instead a fossil mineral, that is mined from phosphate rocks for human usage (Leal et al, 2019). Due to its effective ability to enhance plant growth it has been used extensively, which has contributed to help feed billions of people over the world (Rockström et al, 2009). Despite the mineral's contribution to food security, leakages of phosphorus are also severely problematic with regards to polluted water areas, where eutrophication and damaged ecosystems are related issues. Leachages from cropland is the primary source of phosphorus that ends up in water ecosystems (Rockström et al, 2009). Concerning the fact that phosphorus is a nonrenewable resource there are current predictions concerning the fact that phosphorus might be depleted. The predictions are alarming since the substance is vital for the development of plant cells and has no other substitute (Leal et al, 2019). Related to the dependence of phosphorus in human food production, there seems to be a conflict of interest in the matter. On the one hand, there is an aim of having food security, improved nutrition

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<sup>3</sup> See further explanation of the scientific concept in Appendix 1.

and no hunger, where phosphorus can contribute by enhancing plant growth. But on the other hand, this is contrasted with possibly severe environmental damages which might follow with regard to transgressing planetary boundaries and using up non-renewable resources (Tarasova, 2016).

### **3. Methodology**

*/The methodology begins to describe research design which is followed by data selection including choice of literature, industry, country, companies, information and time frame. The methodology continues by presenting the CONI-model and ends in a discussion part related to some limitations in the methodology./*

#### **3.1 Research Design**

A research design is a plan of the different steps that are to be taken in order to answer the research question. This research follows a deductive approach, which means that conclusions are drawn based on previous theories and given premises. The approach is rather linear, starting from a theory point of view followed by data collection. The empirical findings are analysed, where similarities or differences between the theories and the results can be identified in the discussion. The conclusion potentially leads to revisions of the theories within the field (Bell, 2019). The data analysis is secondary, meaning that the research findings are based on information published and analysed by someone else. As for the methodology, two main strategies for analysing data have been used, the qualitative and the quantitative research strategies (Bell, 2019). The qualitative strategy emphasises the meaning of words, which entails that the data is open for interpretation. The quantitative strategy instead address measurement and is hence commonly focused around numerical or volumetric findings among the data, leading to less eventualities of interpretation. Critique has been raised both against quantitative and qualitative research strategies, since several aspects may affect the results when collecting and analysing data. If being aware of the limitations of the strategies, further caution and understanding might be included in a research. As for critique regarding the quantitative strategy, Bell et al (2019) present the following areas:

1. Quantitative researchers can miss the differences between people and social perspectives and natural science. When it comes to human beings, interpretation and self-reflection play essential parts of how things are observed. Natural science and its objects are not affected by

such subjectivities. A comparison between them, without acknowledging their differences, is presented as ignorant.

2. Quantitative data in social science often originates from qualitative data. The data collected is then presented in specific numbers, but the assumptions and interpretations which might have affected the outcome are not reflected in the numbers.

3. Quantitative data are seen as objective even though the variables have been produced by people and the world they live in. This may create a false static view where social life is seen as independent of the individuals.

As for the qualitative research strategy, other elements of critique have been presented.

A. The subjectivity and impressionistic parts of the qualitative research approach has been questioned. Researchers' own view, personal relationships and interests may be reflected in the research and its results.

B. Qualitative research is complicated to reproduce. Due to the unstructured nature of the approach, there are barely any standards to follow.

C. It is difficult to do any broad generalizations, for instance on whole populations, based on the findings. But on the other hand, it is not generally the purpose in qualitative research either. Instead theoretical generalizations, which can be useful in other areas, can be found.

(Bell et al, 2019)

In order to conduct this research, a version of *the consolidated narrative interrogation* (CONI-model) developed by Beck et al (2010) was implemented. The CONI-model enables both qualitative and quantitative analysis. The CONI-model was considered a suitable approach since it accounts for both research methods, where it hence takes the critique into consideration.

## **3.2 Data Selection**

### **3.2.1 Selection of literature**

Connected to the chosen subject of planetary boundaries, sustainability reporting and the food industry, a literature review of previous research within the field was conducted. All scientific reports included in this research are peer reviewed, which increases the reliability of the information. That is, since peer reviewed research has been read and approved by other

scientists operating within the same research field (Bell et al. 2019). When different reports and theories were found, the most recently published were chosen to collect information from. Primarily, the database Elton B. Stephens Company (EBSCO), was used. However, through the library several additional search sites and universities were reached, such as Elsevier and University of Oxford. Words used for finding relevant articles were *the planetary boundaries, sustainability reporting, food industry, impression management, content analysis, consolidated narrative interrogation and stakeholder theory*.

### **3.2.2 Selection of industry and country**

A starting point when choosing industry was the criteria - *an industry providing necessities for human life*. Due to this benchmark, luxury industries and similar areas were excluded from potentially being selected. With the desired connection to the *planetary boundaries*, and in specific the ones which have exceeded their limits the most, the food industry became the relevant choice linked to its large scale impacts on the two limits.

The research about the *planetary boundaries* originates from a science team based in Sweden. Due to this, there grew an interest to study an industry in the same country, since it was believed to be a greater possibility that the industry had been exposed to the research if it originates from the same country. However, the planetary boundaries generally describe a global view which is not only specified to the impact from Sweden. Yet, related to the fact that large amounts of Sweden's food is imported, the global perspective remains relevant (LRF, 2019).

### **3.2.3 Selection of companies and information to study**

The companies chosen are Axfood AB, Bergendahls Food AB, Coop Sverige AB, ICA Sverige AB and Lidl Sverige KB. These companies account for approximately 90 percent of the Swedish market share and are obligated to report non-financial information (The Swedish Competition Authority, 2018). Since the research aims to examine what the chosen companies highlight, regarding ecological sustainability matters, the data collection for this study will be obtained from information published by the companies themselves. Each company's latest sustainability report was reviewed, and in addition to that, an alternative source was chosen. The alternative source could be an additional voluntary report covering further sustainability matters connected to the food industry that certain companies had chosen to publish. If a company did not publish such a report, additional sustainability

information was obtained from the company's webpage.

### **3.2.4 Selection of time frame**

After selection of industry and what information to study from the operating companies, the time frame was chosen. Since ecological issues, and especially the issues concerning the two selected planetary boundaries are increasing, the main interest was to analyse if actions were taken and/or if understanding of the issues existed **today** among the companies. The most recent presented information was chosen due to the fact that the research aims to receive a better understanding of what improvements are necessary within the companies sustainability work as it is presented today, to be able to decrease the effect on the boundaries in the near future. Therefore, the time frame resulted in sustainability reports from 2020, and alternative sources published between the years of 2017-2021.

## **3.3 The consolidated interrogation model - CONI**

### **3.3.1 Introduction of the CONI-model**

When examining communication from companies', for instance sustainability reports, content analysis can be a useful approach. The consolidated interrogation model, henceforth referred to as CONI, was developed by Beck et al (2010) and presents a new consolidated approach to the previous content analysis research methods. Previously, there were two main specializations within the field of content analysis, mechanistic and interpretative. The mechanistic approach, which falls within the quantitative field, is described as "form oriented" where data measured could be word frequency and/or volume. The interpretive approach is instead qualitative, where focus lies on capturing meaning and receiving a better understanding of what is communicated. The CONI-model combines these two approaches. The mechanistic approach can be relevant when studying information connected to frameworks and information structured in categories, such as GRI. However, if using the mechanistic approach alone, there is a risk that little focus lies in the meaning of what truly is being said, where instead volume or frequency is encouraged. The quality of information published in the reporting may differ, which is why the interpretive qualitative approach can be valuable to include. High quality information sections include direct descriptions of significant effects as well as measurements of performances related to specific targets. Thus, in the sustainability field, information should illustrate how activities related to the company's operations are connected to key environmental issues. It is beneficial to include a

diversity of information, since it reflects on a company's understanding of its complex impact where parts such as responsibility, transparency and regard for decreasing environmental impact can be highlighted (Beck et al, 2010).

### **3.3.2 The CONI-model design**

The CONI-model consists of head-categories and subcategories that are considered relevant according to the chosen theory. The categories are recommended to be selected in a two-step process. Firstly, common themes and keywords are looked for. Secondly, categories selected need to be formulated in a way which captures comprehensive environmental content where the categories are presented with correct definitions. Furthermore, the categories need to differ from each other in order to avoid double coding. The selected categories are then used as search words when conducting the CONI-model research approach on sustainability reports. (Beck et al, 2010)

#### **3.3.2.1 Step one - Coding content diversity**

The first qualitative step aims to code the content of environmental messages presented in the reports, in order to include relevant information in the CONI-model process. Sub-categories, as well as synonyms to the categories, are used as search words when reviewing the information. In this first step it is preferable to not sort out specific words or phrases on results found but to rather include the total paragraph where the search word is mentioned. This is important in order to avoid subjectivity in selections where instead all potential relevant content is qualified to be captured. The collected material is then used in the second step. (Beck et al, 2010)

#### **3.3.2.2 Step two - Coding on the information content scale**

In this qualitative step the content of the sentence or paragraph where the search words occur is evaluated based on the level of information presented, as well as the detail and depth of the presented information. For this step a disclosure score-level system taken from Beck et al (2010) was used. In their table they present definitions for each of the six levels to guide how the information should be assigned and rated. For example for level 0, which is the lowest ranking, the category is not mentioned at all. In contrast the criteria for the highest level 5 the category is mentioned in a qualitative descriptive context, where it is compared between different years alongside the presentation of quantifiable measurements. (Beck et al, 2010)

<b>Score-level</b>	<b>Definition</b>
<b>1</b>	Disclosure addresses the issues related to category; Pure narrative
<b>2</b>	Disclosure addresses issue related to category and provides details; Pure narrative
<b>3</b>	Disclosure addresses issue related to category in numerical way or include qualitative explanations of the issue; Narrative or Quantitative
<b>4</b>	Disclosure addresses issue related to category in numerical way, including qualitative explanations; Narrative and Quantitative
<b>5</b>	Any numerical disclosure to the category including qualitative statements demonstrating year comparisons; Narrative, quantitative and comparable
<b>0</b>	Not mentioning the category

*Table 1. Definition for each score-level. Elaboration based on Beck, et al (2010).*

### **3.3.2.3 Step three - Volumetric measurement**

The third step measures volumetric data in the sustainability reports. This quantitative perspective is considered relevant since it indicates how important a search word is to the company. Search words are hence counted in regards to how many times they are mentioned, which aims to measure the company's commitment and care for the environmental issue concerned. (Beck et al, 2010)

### **3.3.2.4 Summary of the CONI-model steps**

<b><u>Step in the CONI-model</u></b>	<b><u>Summary description</u></b>
<b>Step one</b>	Collect relevant content in its full context
<b>Step two</b>	Review the content connected to the score-levels
<b>Step three</b>	Examine word frequency of the search words

*Table 2. Summary of the CONI-model steps*

By combining the two qualitative steps with the third quantitative step of the CONI-model, the aim is to conduct a more comprehensive and complex content analysis compared to choosing only one of the methods (Beck et al, 2010).



### **3.4 The conducted CONI-model of this research**

#### **3.4.1 Developing the CONI-model**

To select the categories for the CONI-model in this research, the planetary boundaries framework, presented by Rockström et al (2009) were used in Nvivo 2020. Nvivo is a qualitative data analysis software that can help organize and structure data (Nvivo, 2021). The tool was used by conducting a word count on the planetary boundaries research, which resulted in a table of the most common words used. Based on the word search, three head-categories and eight sub-categories were selected. In addition to this, an alternative category was chosen, with the purpose to serve as a comparative category in the quantitative research. As for the head-categories, a general environmental category was included, with the aim of capturing companies' potential overall concern of the planet's limits. The other two head-categories were chosen more directly with respect to the purpose of the research, namely the two most exceeded planetary boundaries. In accordance with the chosen head-categories, Nvivos findings guided in choosing relevant subcategories and search words for the CONI-model. Since the selected companies operate in the Swedish food retail market, where reports hence are published in Swedish, the CONI-model was conducted using Swedish search words to avoid misconceptions. The Swedish version can be examined in Appendix 2. Presented in Table 3 is the English version of the CONI-model. Definitions of scientific concepts used in the CONI-model are further described in Appendix 1.

<b>Head-categories</b>	<b>Subcategories</b>	<b>Search Words</b>
<b>Planetary Boundaries</b>	<b>Ecological limits</b>	<i>Environmental limits</i> <i>Planet</i> <i>Environmental goals</i> <i>Environmental demands/risks</i>
<b>Biosphere Integrity</b>	<b>Biodiversity</b> <b>Ecosystem services</b> <b>Land-system change</b>	<i>Biodiversity</i> <i>Species</i> <i>Extinction</i> <i>Eradication</i> <i>Ecosystem services</i> <i>Pollination</i> <i>Ecosystems</i> <i>Land-system change</i> <i>Land</i>
<b>Biogeochemical Flows</b>	<b>Nitrogen</b> <b>Phosphorus</b> <b>Nutrients</b> <b>Eutrophication</b>	<i>Nitrogen (N)</i> <i>Phosphorus (P)</i> <i>Nutrients</i> <i>Overfertilization</i> <i>(Mineral) Fertilizer</i> <i>Eutrophication</i> <i>Leaching</i> <i>Acidification</i> <i>Agriculture</i> <i>Cultivation</i>

Table 3. The chosen head-categories, subcategories and search words in English

Presented below is the alternative category that was included in addition to the categories above. The alternative head-category is not connected to the two chosen planetary boundaries *biosphere integrity* and *biogeochemical flows*. Instead the purpose of this category is to examine if companies include an alternative environmental issue, where the category serves as a comparative category to the three other head-categories in the *quantitative* study.

<b>Alternative head category for comparison in quantitative study</b>	<b>Subcategories</b>	<b>Search Words</b>
<b>Alternative category</b>	<b>Carbon dioxide</b>  <b>Climate change</b>	<i>Carbon Dioxide (CO<sub>2</sub>)</i> <i>Climate change</i>

Table 4. The chosen alternative category, subcategories and search words

### **3.4.2 Using the conducted CONI-model**

For the collection of data in the sustainability information provided by the companies, Nvivo 2020 and the search function cmd + F for MacBook was used. This was due to the fact that all the reports were conducted in Swedish, which made it necessary to use a complementary search function in addition to Nvivo, since all functions of the tool were not applicable in Swedish.

Due to the fact that some Nvivo functions did not work in Swedish, such as the search function for synonyms, the issue was addressed manually instead. Additional search words and synonyms were hence included in the CONI-model aiming to capture all possible content of a subcategory. To avoid double coding in both the quantitative and qualitative steps, a search word hit was excluded if it occurred multiple times in the same paragraph or context. The same strategy was also applied if the different search words or subcategories related to the same head-category appeared in an interconnected context.

In the qualitative steps when collecting the content and reviewing the information in accordance to the score-levels, the researchers had physical meetings and worked through the content together. The choice was made to reduce risk of different subjective assessments and to hence increase reliability.

### **3.5 Methodology discussion**

The decision to review secondary data presented in the sustainability reports and alternative sources was motivated by the aim of reviewing information available to the general public and hence all stakeholders. This was believed to be a reliable source of the companies' main focus areas in their ecological work and their possible concern of the planetary boundaries. A potential additional source of primary data, such as interviews, could however have added additional insights, potentially primarily regarding companies' future aims where information perhaps have not yet been published in reports.

Due to the selection of time frame, only the most recently published reports and alternative sources of information were reviewed. There is a possibility that the companies have mentioned other ecological information in previous publications, which consequently will not be included in this research. However, it did not seem reasonable for the companies' to

exclude information of planetary boundaries in the most recent publications, if they had stated them before, due to the increasing urgency of the matter. Thus, the latest published information was considered valid.

The CONI-model was chosen with the aim to conduct a more comprehensive and complex content analysis compared to only choosing either the qualitative or quantitative approach. However, as stated in the critique towards the two approaches, subjective assessments by the researchers and potential errors due to the human factor may have affected the results, regardless of an aim to conduct the research objectively. Another factor concerning the CONI-model is the edit of definition for the third score-level. In the original CONI-model, created by Beck et al (2010), the third level could only be reached if having quantitative measurements. However, due to the overall lack of measurements, as well as the complexity of the matter, where biosphere integrity has not fully been quantified in the original planetary boundaries research (Rockström et al, 2009), an additional part was added to the definition. The third score-level could, in the edited version, also be achieved if presenting qualitative explanations of the issue. Consequently, the definition was to include either quantitative measurements or qualitative descriptions.

As for avoiding double coding in the head-categories, it was taken into consideration among all subcategories apart from nitrogen and phosphorus. The two nutrients each received points, in both the qualitative and quantitative steps, even if they were mentioned in the same paragraph. This was due to the fact that the research by Rockström et al. (2009) accounts for the two separately. Since they involve problems both on their own and correlated to each other, it seemed reasonable to do the same as the original research of the planetary boundaries.

The chosen sub-category *land system change* is one of nine planetary boundaries, which is not specifically highlighted in this research. However, since environmental problems are interrelated and complex, land system change was chosen due to its effect on biosphere integrity. Findings connected to the sub-category of *land system change* was only included if related to biosphere integrity.

## **4. Empirical Findings**

### **4.1 Company Description**

*/ The first part of the empirical findings covers essential information about the companies, such as if the companies follow a framework for their sustainability reports, each company's market share as well as the alternative source chosen for each company. All companies are obligated to conduct a sustainability report according to the Swedish law. /*

#### **4.1.1 Axfood**

The Axfood group consists of the retail chains Willys, Hemköp, Tempo and Handlar'n. The total market share for the Axfood group is slightly below 20 percent of the Swedish food retail industry. The company has over 11 000 employees and a net turnover of 54 billion SEK in 2020 (Axfood, n.a). Axfood presents that it is their responsibility to show the way for the customer to make more conscious choices, and it is a mission they want to lead in their industry. Furthermore, their overall mission is to provide good, affordable and sustainable food for everyone. Their sustainability strategy is divided in three categories, *The Food, The Man and The Environment* and their sustainability reports follow the GRI standards (Axfood, 2020b). The report "Food 2030" was chosen as the alternative source for ecological sustainability information to represent Axfood. The report was first published in 2016 and it was lastly updated in 2020. It accounts for the present and future ecological challenges in the industry and gives concrete directives to politicians, the industry itself and consumers (Axfood, 2020a).

#### **4.1.2 Bergendahls Food**

Bergendahls Food conducts both wholesale and have their own stores where the biggest one is City Gross. The company has a market share of seven percent in the industry, 4000 employees and their net turnover was 12.5 billions SEK in 2020 (Bergendahls Food, n.a). Their long-term sustainability strategy is to interpret and integrate The United Nations sustainable development goals (SDGs) in the best way possible for their business. Since an alternative source was not found, the ecological sustainability information presented at Bergendahls website was reviewed (Bergendahls Food, n.a).

### 4.1.3 Coop

Coop is a consumer cooperation that consists of 28 associations, their market share is around 20 percent and the net turnover 2019 was 29,3 billion. The aim with the cooperation is to provide economic benefits and make sustainable consumption possible for Coops members. Three of the largest associations are Coop Norrbotten with 740 employees, Coop Väst with 1529 employees and Coop Norr with 1734 employees. The three associations each have conducted sustainability reports for the year 2020 that follows the GRI standards. (Coop, n.a.b)

In recent years Coop has taken the initiative to provide consumers with sustainability declarations of their products (Coop, n.a.a). The declarations provide information about a product's impacts related to ten different categories. The categories are *biodiversity, climate, fertility, water, pesticides, eutrophication, animal care and antibiotics, working conditions, local population* and lastly *legal compliance and traceability*. When developing the sustainability declaration, Coop conducted a score system measuring products' impact on environmental issues, where 5 is the worst score and 1 is the best. Each score level has different criterias to fulfill in order to reach a certain score. The measured information of a product's sustainability impact can now be found by using their app, where the product of interest can be scanned in order to receive further knowledge about it. The report that accounts for the regulations for their sustainability declaration was chosen as the alternative source representing Coops ecological sustainability information.

### 4.1.4 ICA

Ica is the leading actor in the industry with 23 000 employees and a net turnover of 123 billions SEK in 2020 (ICA, n.a.a). Ica states that their market share is 36 percent, whereas The Swedish Competition Authority (2018) instead means it is 51 percent. ICA reports on their sustainability work both quarterly and annually and the annual report is reviewed by a third part. They have been using GRI for their reporting, but since 2018 they use their own framework for sustainability reporting (ICA, n.a.b). The last couple of years ICA have presented an additional annual report called “a report about the future”. The report’s aim is to show what steps are necessary to accelerate sustainable development in the food industry (ICA, 2020a). The report was chosen as the alternative source for ecological sustainability information.

#### **4.1.5 Lidl**

Lidl is Europe's largest food retail chain and they joined the Swedish food retail market in 2003. Lidl has 4200 employees currently working in Sweden and had a net turnover of 11,7 billion SEK in 2020 (Lidl, n.a.a). Their market share is approximately 6 percent in Sweden (Dagens PS, 2021). The company aims to combine high quality products with low prices, while at the same time contributing to a sustainable society. Lidl presents the company's sustainability work in their sustainability report which is conducted with help from the GRI standards (Lidl, 2020). Apart from the sustainability report, several other guiding documents covering certain products and their ecological impact have been published on their website (Lidl, n.a.b). The guiding documents regarding critical food products were chosen as alternative sources of ecological sustainability information, but since only one source was chosen for the other companies, an average number of search-word hits was counted for.

#### **4.2 Empirical analysis**

*/Presented below are the results from the CONI-model. The chapter starts with general findings in the sustainability reports and the alternative source. The next section presents the result for each subcategory. Two diagrams for each subcategory are presented, one qualitative and one quantitative. After the results concerning the subcategories, the quantitative research findings from the alternative environmental category is presented. The findings from the alternative category will be used for comparison with the findings from the three other chosen head-categories of this research. Lastly, a summary of the findings is presented. /*

##### **4.2.1 General findings in the sustainability reports versus the alternative source**

When collecting the content for the two first qualitative steps in the CONI-model, significantly more hits and information were found in the alternative source than in the sustainability reports. The alternative source gave approximately 35 % more content. Regarding the score levels of the content, all hits that reached the 4th score level were information collected from the alternative sources. Information collected from the sustainability reports generally received lower score levels.

The findings from the third quantitative step in the CONI-model were similar to qualitative steps, as more findings and hence higher word frequency were found in the alternative

sources compared to the sustainability reports. Although, regarding the *alternative category for comparison*, there were significantly higher word frequency in the sustainability reports than in the alternative sources.

#### 4.2.2 Findings in CONI-model categories

The diagrams to the left present the quantitative results, where word frequency has been measured in each company from 0-20 words. The qualitative research is presented in the diagrams to the right, where score-levels from 0-5 in the CONI-model are shown for each company.

##### 4.2.2.1 Planetary Boundaries

###### 4.2.2.1.1 Ecological limits

The results from the subcategory *ecological limits* show that the highest score level received is 3, in which the subcategory is described in a qualitative way. Both ICA and Axfood reached score level 3.

Overall *ecological limits* or information about planetary boundaries were not search words frequently used by the companies, with the exception of Axfood.

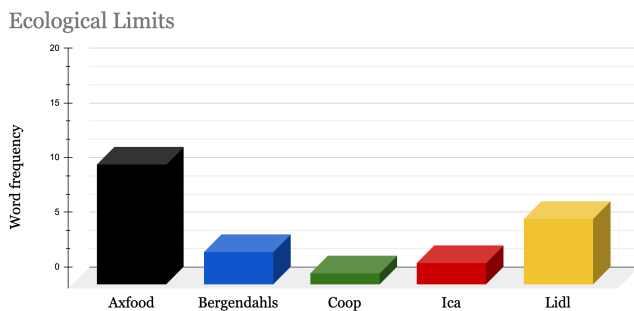


Figure 2. Word frequency - Ecological limits

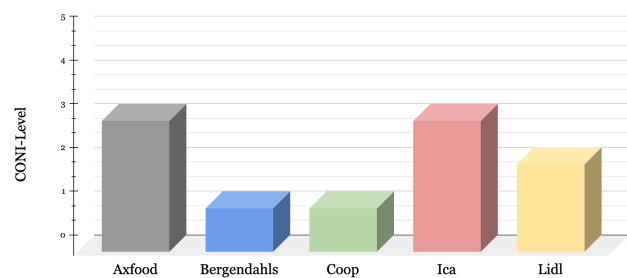


Figure 3. Score-levels - Ecological limits



## 4.2.2.2 Biosphere Integrity

### 4.2.2.2.1 Biodiversity

Detailed information about how the food industry affects biodiversity is presented by all the companies. Furthermore, all companies' except Bergendahls, describe the problem in a qualitative and descriptive way and therefore reach the score level 3.

The quantitative research shows biodiversity is frequently used by all the companies, and that it is the category that received the most hits, with exception of the *alternative category for comparison*.

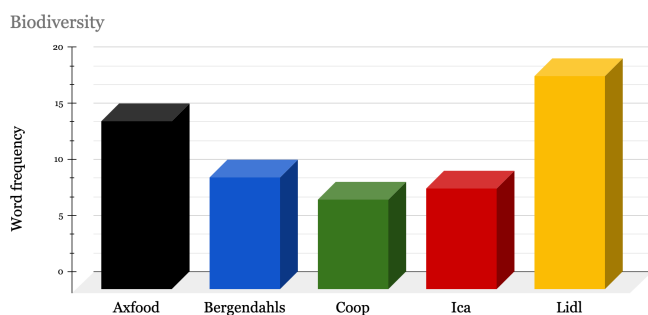


Figure 4. Word frequency-Biodiversity

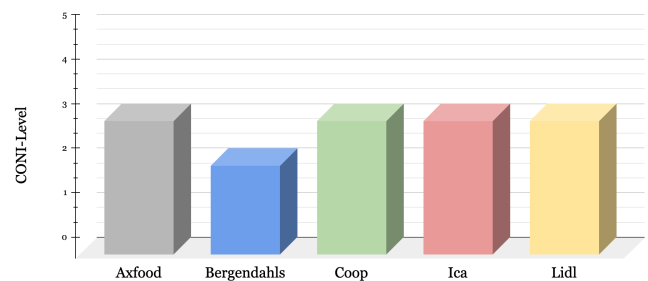


Figure 5. Score-levels - Biodiversity

### 4.2.2.2.2 Ecosystem services

Ecosystem services were mentioned by all companies with relatively high score levels in the qualitative analysis. Among them was Coop's qualitative description which included numerical information leading to a reached score of 4. The information was presented in their sustainability declaration as follows:

“Productions that involve high risk concerning ongoing deforestation or land-system change, which have not committed to preserving all forest and/or preserving natural **ecosystems**, ..., get a 5 in score. Meat production in Brazil and shrimp production in Vietnam were two such examples of productions with the score 5, where the productions are to be phased out if they cannot verify that they have taken actions to handle the risk properly.” (Coop, 2021b, p.5)

The citation above can be found in Appendix 5 in Swedish. Examples of information reaching each score-level in the qualitative research, related to the ecosystem service category, is presented in Appendix 3 in English and in Appendix 4 in Swedish.

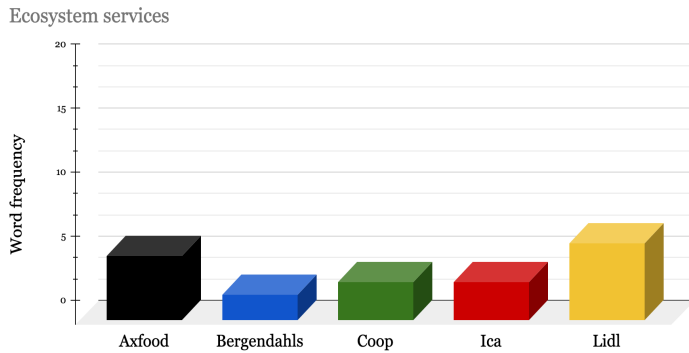


Figure 6. Word frequency - Ecosystem services

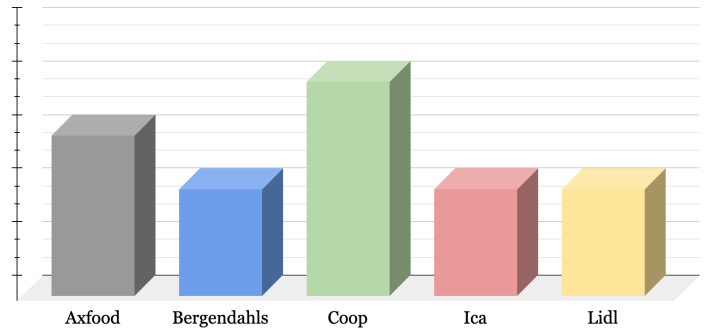


Figure 7. Score-levels - Ecosystem services

#### 4.2.2.2.3 Land-system change

The result from the category *land-system change* differed between the companies.

As for the quantitative results, Axfood presents the matter 14 times whereas Bergendahls and Coop did not mention the category at all.

In the qualitative research Axfood reached score level 4. Level 4 is the highest score achieved by Axfood in this study and their description of the problem was presented as:

“The vision was that our food should not eat our food - today about 70 percent of all arable land is used to grow animal feed. We wanted to find alternatives to soy because it grows poorly here (in Sweden) and therefore has to be grown on the other side of the globe. In addition, often in a way that harms both nature and people in production.”. (Axfood, 2020, p.24)

The citation above can be found in Appendix 6 in Swedish.

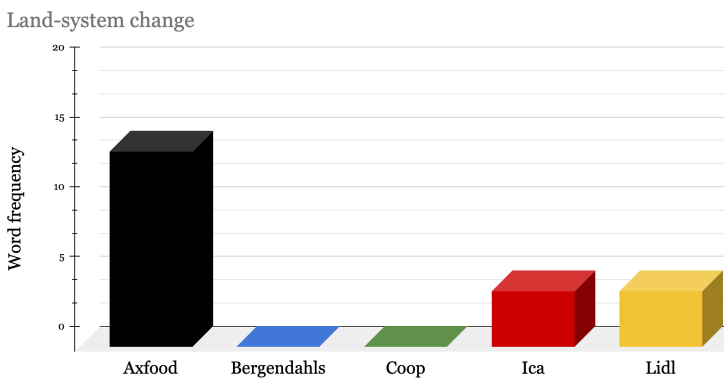


Figure 8. Word frequency - Land-system change

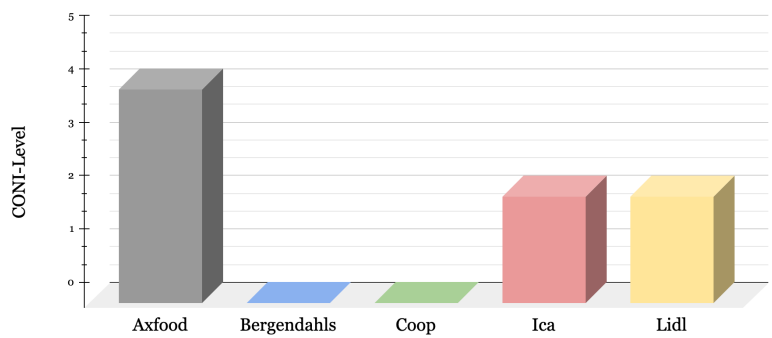


Figure 9. Score-levels - Land-system change

### 4.2.2.3 Biogeochemical Flows

#### 4.2.2.3.1 Nitrogen

The qualitative result from the category nitrogen differed significantly between the companies. Coop described the problems correlated with nitrogen use in food production in a qualitative way and therefore received score level 3.

The subcategory nitrogen is one of two categories only including one search word. ICA brought up the search word five times, while Lidl and Bergendahls did not mention it at all.

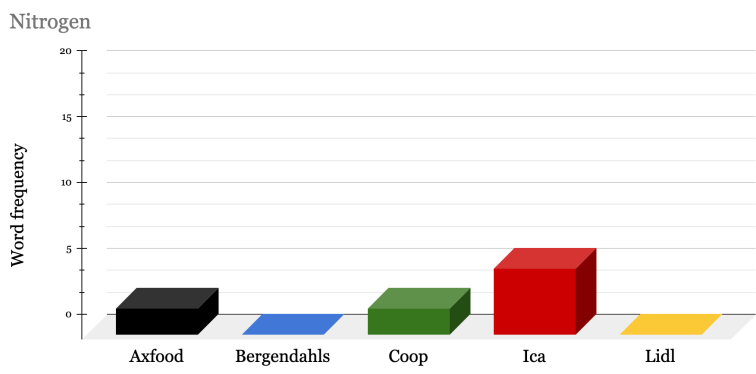


Figure 10. Word frequency - Nitrogen

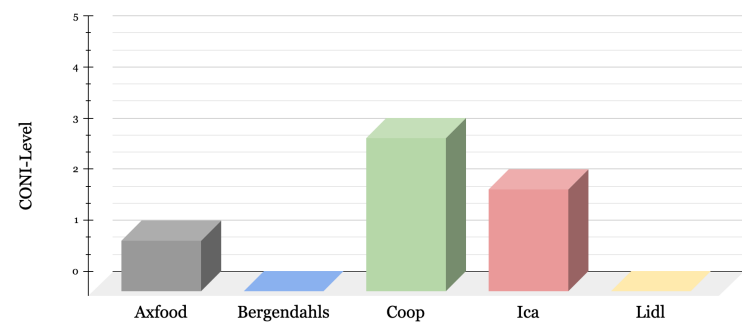


Figure 11. Score-levels - Nitrogen

#### 4.2.2.3.2 Phosphorus

Phosphorus is the category which received the least amount of hits in the study. Just like the subcategory nitrogen, it only consisted of one search word.

Axfood simply mentioned the search word, while Coop gave a qualitative description of the problems related to phosphorus use in food production, and therefore received score level 3.

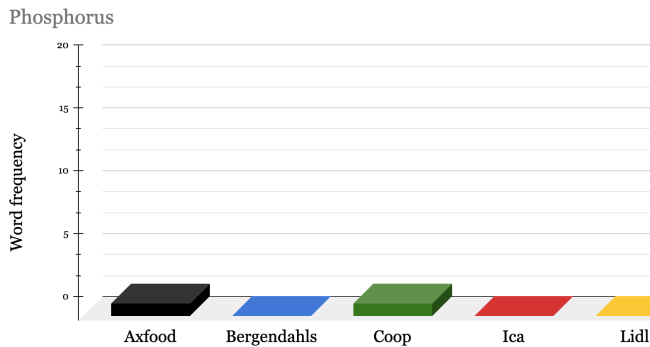


Figure 12. Word frequency - Phosphorus

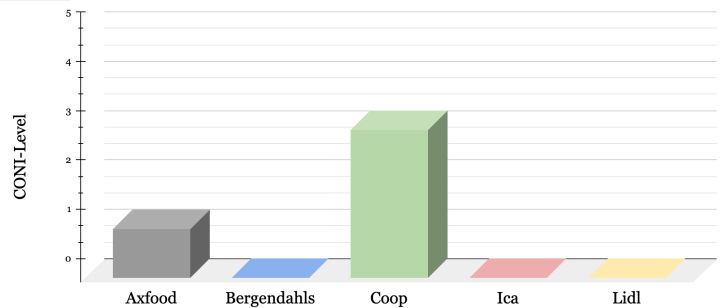


Figure 13. Score-levels - Phosphorus

#### 4.2.2.3.3 Nutrition

The subcategory *nutrition* was not mentioned by Bergendahls and Coop and had overall low score levels. Axfood reached the highest score level of 2 in the subcategory, since details were used to describe the issue.

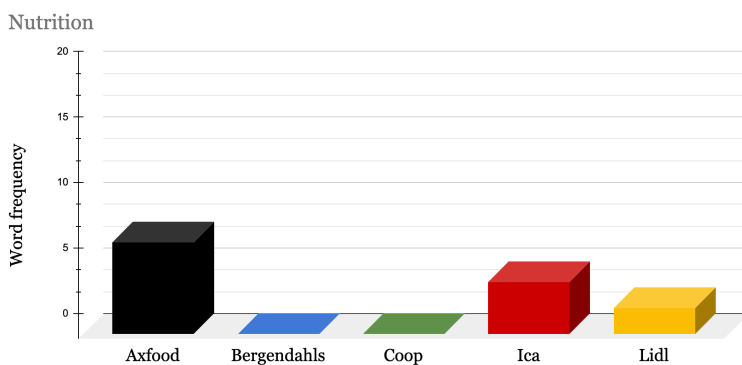


Figure 14. Word frequency - Nutrition

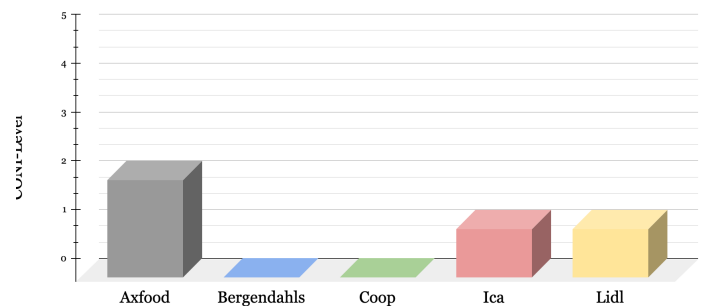


Figure 15. Score-levels - Nutrition

#### 4.2.2.3.4 Eutrophication

As for the eutrophication subcategory, the results varied severely. Regarding word frequency, Lidl mentioned eutrophication almost twice as many times as Coop, where Lidl had 11 hits and Coop had 6. Bergendahls did not mention eutrophication at all.

Lidl presented the matter descriptively, including details, which reached a score level of 2. However, Coop got the highest score level, a 4. The high score was given partly due to the sustainability declaration's design, where eutrophication is one of the categories measured. Furthermore, detailed qualitative descriptions of the issue were presented by Coop as follows:

“Eutrophication occurs due to the release of too many plant nutrients in soil and watercourses, where agricultural practises and forestry currently account for the largest share. The effects of the increased supply of nitrogen and phosphorus leads to changes in watercourses, lakes and coastal ecosystems. An example of this is the unnaturally strong algal bloom in the Baltic Sea, where a few adaptable species are kanstaking over since the extra nutrients leads to severely increased biological production. There are cultivation certifications and cultivation systems that minimize leakage of plant nutrients to the surrounding environment, e.g. through precision-adapted fertilization, protection zones, time of spreading, plow-free cultivation and catch crops. The World Bank's data are used as an assessment basis for the outcome of the eutrophication parameter (in the sustainability declaration) on sales of mineral fertilizers per country.”. (Coop, 2021b, p.8)

The citation above can be found in Appendix 7 in Swedish.

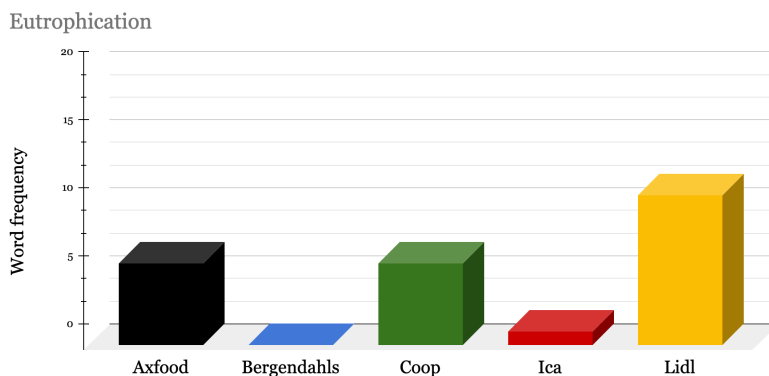


Figure 16. Word frequency - Eutrophication

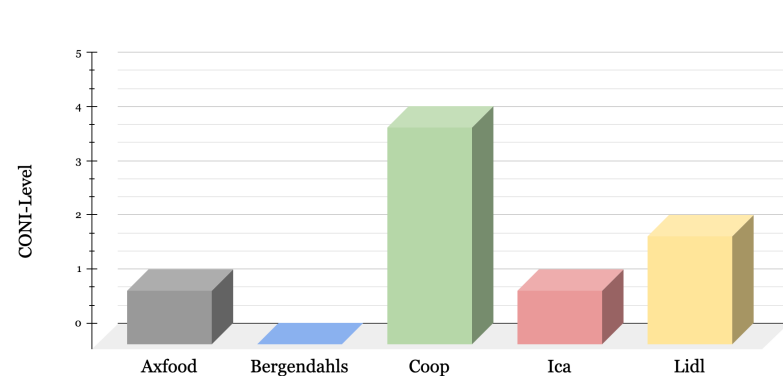


Figure 17. Score-levels - Eutrophication

#### 4.2.2.4 Alternative head category for comparison

The result in this category shows how often the search words *climate change* and *carbon dioxide* are mentioned by the companies. The diagram of *carbon dioxide* has a maximum word frequency of 70, compared to the maximum word frequency of 20 in all other presented diagrams.

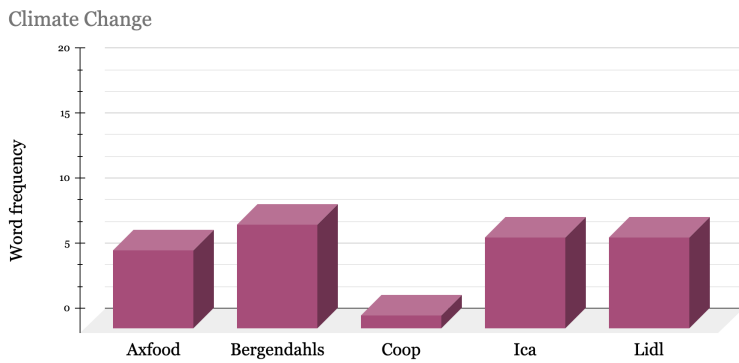


Figure 18. Word frequency - Climate change

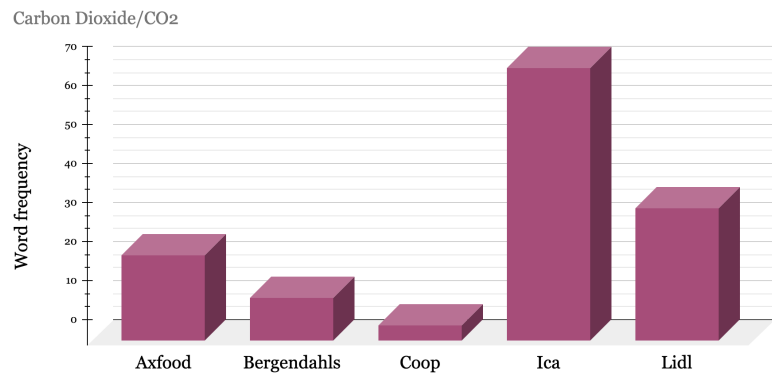


Figure 19. Word frequency - Carbon Dioxide (CO<sub>2</sub>)

## 4.2.3 Summary of the findings

### 4.2.3.1 Quantitative findings

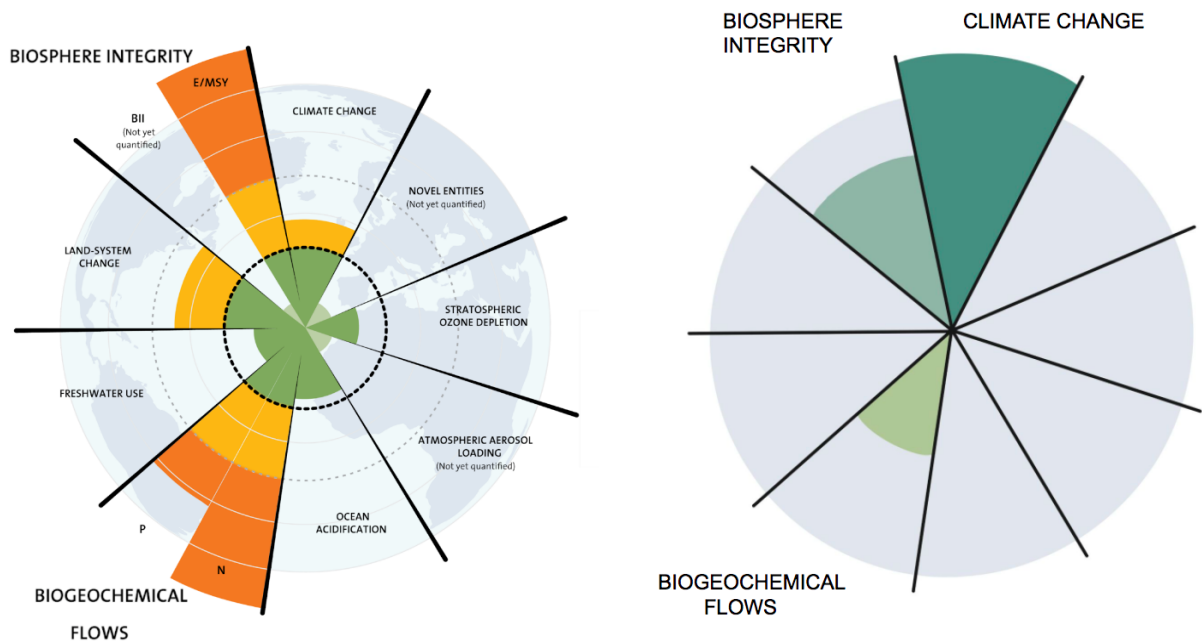


Figure 20. Own elaboration of the planetary boundaries (left-hand side), with the quantitative results (right-hand side) presented next to each other. The qualitative summary is illustrated in the figure based on the word frequency hits: Climate change:170, Biosphere integrity:102 and Biogeochemical flows: 48.

To provide information about to what extent the two boundaries *biosphere integrity* and *biogeochemical flows* were mentioned in the sustainability information conducted by the companies selected to represent the industry, Figure 20 was made. As for the illustration on the right-hand side, the alternative category was also included for comparison, where it clearly got the highest number, receiving 170 hits, despite only consisting of two search words. Biosphere Integrity got 102 hits with 9 search words and lastly, biogeochemical flows got the lowest number of hits, receiving 48, and this head category consisted of 11 search words.

#### 4.2.3.2 Qualitative findings

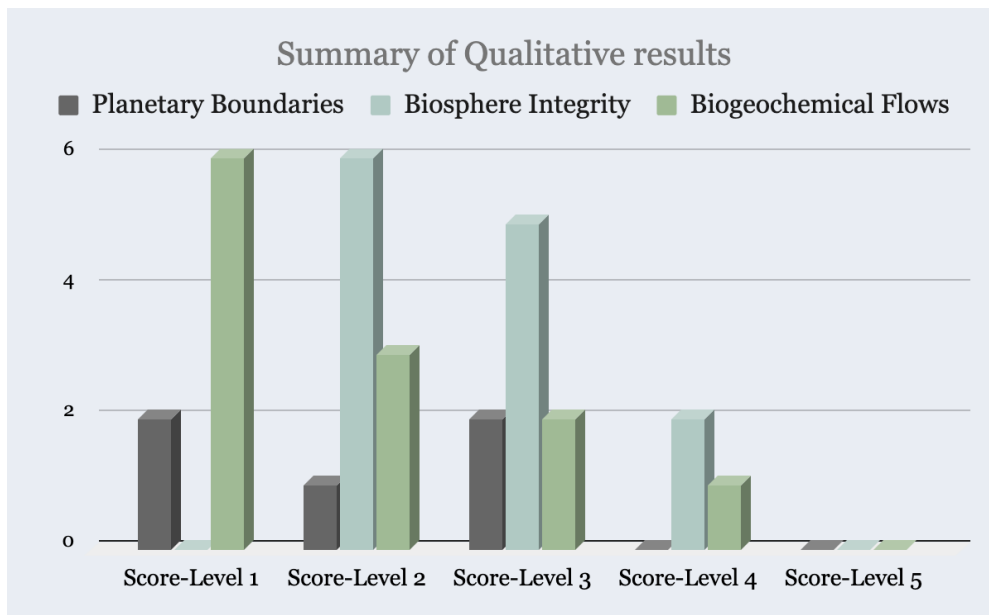


Figure. 21. Illustration of the qualitative results

The figure above presents a summary of the qualitative results, where information reaching each score-level is presented in the pillars. The numbers on the vertical axis present how many times information reached each score-level. The three head-categories are illustrated by three different colors. *Biogeochemical flows* are mostly mentioned purely narrative, hence score-level 1. The demand for details and qualitative descriptions increases with each score-level, where findings of such content decreased for each score-level related to information about biogeochemical flows. *Biosphere integrity* was mostly mentioned in a purely narrative way including details of the issue, hence score-level 2. Similar to biogeochemical flows, the size of the pillars decrease for each score-level. Although biosphere integrity received the highest overall score-levels among the head-categories. As for the *planetary boundaries*, it is mentioned a few times both in the first, second and third score-level. The highest score level in the CONI-model was never achieved in any of the head-categories.



## 5. Discussion

*In this chapter the empirical findings are discussed and analysed based on the theories presented in the literature review. Firstly, a discussion for each head-category is presented to answer the research question. Secondly, a discussion of the alternative category followed by a paragraph discussing the sustainability reports in comparison to the alternative sources is presented. Lastly, the sections ends with a more general discussion./*

The content analysis conducted, based on the CONI-model approach, provided findings of:  
*To what extent are the two planetary boundaries biosphere integrity and biogeochemical flows taken into consideration in the Swedish food retail market?*

Starting from a broader perspective, the lack of word frequency in the head-category of **planetary boundaries** indicated that the general ecological concern was minor and fractured, which aligns with Chkanikova and Monts statements (2012). The general concern of **planetary boundaries** was in particular considered by Axfood, but as for the score level of the information, the findings show lack of quantitative measures of the company's impacts on earth systems, similarly to Whitemans research (2013). It is considered problematic that the companies' do not acknowledge the planet's limits more thoroughly, since the companies' operations and utilization of the environment may affect both current and future generations. Nevertheless, all companies' in the Swedish food retail market raised the issue to some extent, which significantly differs from the low rate of concern that Bjørn et al.'s (2017) found in their research paper. The increased inclusion of the planet's boundaries in this research, can be viewed as an improvement when compared with Bjørn et al. 's (2017) findings.

With regards to **biosphere integrity**, it was discovered to be the most important head-category to the companies. An explanation could be that in recent years, NGOs such as the World Wildlife Fund have raised the concern of biodiversity loss. Due to this, the media has brought up the issue and aligned with Rockström et al.'s (2009) statements, calling it the ongoing sixth mass extinction (The Guardian, 2018). Since the food industry has large scale impacts that negatively affects biodiversity to a great extent, it could be perceived as ignorant by stakeholders if the companies do not bring up the issue when presenting ecological issues connected to their industry. Even so, there is a lack of specific measurements presented,

which leads to doubts about if the issue actually gets properly managed by the companies. The disconnection between presenting the issue as important, but lacking numerical measurements of the problem, can be connected to both *stakeholder theory* and *impression management*. If biodiversity loss is seen as common knowledge in society, stakeholders will more likely demand action concerning the issue. If that is the case, the companies in Sweden's food retail industry will want to bring up the subject in order to retain their legitimacy and public image.

Apart from *stakeholder theory* and *impression management*, another potential explanation for the lack of measurements is the complex nature of the issue, where this research supports Whitemans suggestions for further research and collective actions (2013). Because even in the planetary boundaries research, presented by Rockström et al. (2009), the problem has not fully been understood and measured. With that in mind, it could have been difficult for the companies to thoroughly present and act on the matter and hence to receive high score levels in this research.

Switching focus to **biogeochemical flows**, the mild concern among the companies regarding nitrogen and especially phosphorus is alarming. A significant discovery was that Bergendahls never mentioned any of the search words in the head category. With the food industry's massive impact on the two areas, where phosphorus is predicted to possibly even become depleted, the lack of information presented is a concerning finding. Instead of including biogeochemical flows, other alternative information that is not as connected to the industry is more commonly brought up in sustainability information, see *alternative category*. This relates to all companies and not exclusively Bergendahls. The results do therefore not align with Bjørn et al (2017) recommendations to include ecological concerns which especially can be connected to, in this case, the food industry. The finding can be related to *stakeholder theory*, since the societal debate rarely includes the nutrients and their effect on ecological matters such as eutrophication, a potential explanation can be that few stakeholders put pressure on the companies' to include biogeochemical flows. Therefore, there are low incentives for the companies' to present the issue and actively manage it. A possible way to manage the issue could be to consider the environment as a stakeholder. This is something briefly mentioned by Jensen (2002), where thoughts arise on how the environment can be implemented as a stakeholder to further manage the issue. An underlying fact which might complicate the matter is the lack of economic incentives to consider the environment as a

stakeholder in the short term. This is because the environment cannot refuse to support companies, as shareholders and customers can. Instead, environmental side effects appear in the long term, where damages caused can trigger unmanageable consequences and be irreversible. A potential option could be to implement higher legal demands, making it mandatory to consider the environment as a stakeholder.

As for the **alternative category**, it received 68 more hits than the most mentioned head-category biosphere integrity, despite the use of significantly less search words. The high number of hits can be connected to both *stakeholder theory* and *impression management*. Regarding companies taking on ecological responsibility, a current barrier is the fact that it all too often results in information about a company's carbon dioxide emissions. A possible explanation can be that the media frequently reports on issues related to climate change and with that the carbon dioxide emissions. Therefore stakeholders potentially request commitments regarding carbon dioxide emissions. Consequently, the *stakeholder theory* can be an explanation to why the alternative category is brought up more often than the two chosen planetary boundaries. Due to the fact that climate change and carbon dioxide emissions are not as specifically related to the food industry's core activities, as for instance biogeochemical flows are, the proportion of concern does not align with the impact. When the alternative category gets mentioned vastly more frequently, the matter can also be perceived as *impression management*.

An interesting finding was to what extent the two planetary boundaries were integrated in the **sustainability reports** of the companies compared to the **alternative source** of information chosen. A general finding when retrieving information from the sustainability reports, was partly the low word frequency, but especially the limited amount of qualitative detailed information explaining the search-words. When the alternative source was reviewed, the lack of information in the sustainability reports became even more clear since all high score-levels in the CONI-model were found in the alternative source. An explanation to the lack of information in the sustainability reports is believed to be the vague description in the Swedish law. This due to the fact that there are no clear guidelines of what environmental impacts need to be presented. In the case of the GRI standards and the material principles, they were used by some of the companies when they conducted their sustainability reports. However no clear discoveries were found that the companies using GRI considered the planetary

boundaries more carefully, since there was a lack of information concerning *biosphere integrity* and especially *biogeochemical flows* in the sustainability reports. Thus, the guidance provided by the material principles, concerning what information should be presented related to topics chosen in the GRI, seems inadequate for its cause. As a result, all of the actors studied in this research, except Bergendahls, evidently felt the need to conduct a complementary report on ecological sustainability. The initiative by the companies to present an alternative source of ecological sustainability indicates that they themselves believe the sustainability reports are not enough. The fact that an alternative source of information was presented to the public is viewed as positive by the authors of this research, since it provides valuable ecological knowledge to stakeholders. However, since the alternative source is optional there are no regulations on the information presented there, the companies can just *present* the information about current and future challenges in the industry. There are no demands to show *how they intend to work* with the challenges presented. This turned out to be the case concerning all the alternative sources, where companies' present information about the planetary boundaries, but do not necessarily integrate clear goals or measurement systems into their sustainability strategy. With that in mind, the motives of presenting such additional information can be connected to *impression management*. This is because stakeholders may believe that the presented ecological information is actively managed by the companies' sustainability strategies, even if that is not the case. If the companies' work with the environmental matters presented in the alternative source actively, questions arise regarding why the information has not been included in the sustainability reports as well.

However, Coop could be argued to be an exception to this, related to the sustainability declaration, where the company has taken on the challenge to include quantifiable measures in a self-designed ranking system. In the sustainability declaration, the company examined how they planned to address the challenge and following changes needed, including numeric measurement systems, where products receiving a bad score had to be phased out (Bjørn et al, 2017). The sustainability declaration can be used by customers to help guide them towards more sustainable choices, which can be aligned with Bjørn et al (2017) recommendations. Nevertheless, the main responsibility then lies with customers' decision to potentially opt out products with large ecological impacts, which can be questioned whether or not that is the most effective way towards a more sustainable future.

The aim of this research has not been to conduct a comparative study between the reviewed companies. However, an interesting additional factor to discuss is the reasonable proportion of responsibility in relation to the companies market shares in the industry. First, it could be argued that ICA, who is the market leader, could take a greater responsibility concerning the ecological impacts caused by the industry. Furthermore, Bergendahls has been used as an example of a company not taking the planetary boundary biogeochemical flows into consideration, but Bergendahls also has a relatively small market share. As for Coop and Axfood who each have approximately 20 percent market share, both companies' have at times presented ecological issues more thoroughly, since score-level 4 has been reached. Due to the overall fractured commitments in the industry regarding ecological issues, Axfood and Coops incentives could perhaps be, apart from concern for ecological matters, an opportunity and a strategy for competitive advantage. Due to the vague descriptions in the law and further voluntary guidelines, companies sustainability commitments differ since it is open for interpretation.

As previously discussed, ecological issues presented to the general public seem to affect what is highlighted in the sustainability information presented by the companies. With respect to that, the planetary boundaries research which has been used as a framework in this research, might not have gotten the amount of attention necessary in the media yet to be seen as general knowledge. If this can be seen as an acceptable explanation for the companies to not specifically account for their impacts on the planetary boundaries is debatable. However, if reporting on ecological sustainability, it seems highly questionable to not account for the most severe ecological impacts caused by the industry one is actively operating in. A suggestion aligned with Whiteman et al. (2013) statement, could be to use the planetary boundaries as a framework for guiding companies' in their ecological sustainability work.

## 6. Conclusion

*/The final chapter initially summarizes the thesis and answers the research question, a section of contributions follows and lastly suggestions for further research is presented./*

The research examines the Swedish food retail markets concern of the selected planetary boundaries, with an aim to receive a better understanding regarding the companies efforts related to ecological limits. The research findings are based on the CONI-model approach which reviews sustainability publications presented by the five biggest retail food companies in Sweden. The findings state that all the companies cover at least one of the two highlighted planetary boundaries to some extent. The results indicate that natural science has been integrated into the corporate sustainability field. However, a general lack of numeric measurements and qualitative descriptions was discovered, especially in the review of sustainability reports. *Biosphere integrity* and *biogeochemical flows* are not considered to be included in a reasonable proportion to the food industry's severe and alarming impacts on the environment. Due to the vague guidelines in the Swedish law and the GRI framework, *impression management* and *stakeholder theory* might affect what topics companies chose to take into account, instead of making decisions based on ecological urgency. The mild consideration for especially *biogeochemical flows* could be explained by *impression management* and *stakeholder theory*, connected to lack of concern in the media and general minor stakeholder pressure. Findings from the alternative category support this idea. Based on the idea that a functioning environment lays the foundation for not only a healthy planet and the people living here, but also for the food industry, it seems reasonable to make sure that operations stay within the planet's ecological limits. Increased ecological responsibility needs to be taken into further consideration, where the size of the challenge cannot serve as an excuse.

### 6.1 Contribution

The research contributes to a better understanding of the Swedish food retail markets' concern for the two planetary boundaries that are most related to the industry. Even though ecological concerns exist in a wider range among companies compared to previous research, future environmental commitments are suggested to prioritize the matter further. The findings can hopefully serve as encouragement for future improvements among companies', both within

and outside of the food industry, to especially consider urgent environmental fragments that are connected to the businesses operations. Due to the fact that both the regulated Swedish law and GRI present such an aim, the guidelines are considered to be too vague. The findings from this research state that the legally demanded sustainability reports provided less insights than the voluntary alternative source of information did, which support the assumption that both legal demands and the GRI guidelines are not sufficient enough. To facilitate what issues to take into consideration, the planetary boundaries could be used as a framework for guidance in policy making and in companies' sustainability strategies.

## **6.2 Recommendations for future research**

Based on the findings, future research is called for. Firstly, a greater understanding of potential effects linked to increased legal demands and guidelines is recommended. A suggestion is to examine different legal demands and guidelines that have been implemented to explore the effect they had, compare them, and to hence recommend the most effective ones for future improvements.

Secondly, further exploration of additional perspectives related to the described research question in this research can be conducted, where primary data from interviews and other potential sources can be included. A comparison between primary data and secondary data can be examined to see if concerns regarding the matter differ.

Thirdly, the media's effect on companies' concern regarding different environmental matters can be explored, where questions about effects of stakeholder pressure can be answered. In more detail, researchers can examine if there is a correlation between an environmental matter's attention in the media and the concern for the same matter in sustainability informaton presented by companies.

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## Appendix 1 - Definition of scientific concepts

<b><u>Subcategory</u></b>	<b><u>Definition</u></b>	<b><u>Search words</u></b>
<b><i>Biodiversity</i></b>	The current loss of biodiversity is rated as the sixth major extinction event in the history of life on Earth. It is the first one to be driven by human activity and the rate of species extinction increased by 100–1000 times the background rates that were typical over Earth’s history. The loss of biodiversity can increase the vulnerability of terrestrial and aquatic ecosystems to changes in climate and ocean acidity. This can have effects on Earth System functioning and interact with several other planetary boundaries. (Rockström et al, 2009)	<i>Biodiversity Species Extinction Eradication</i>
<b><i>Ecosystem services</i></b>	Agricultural ecosystem services are vital for human wellbeing where conditions for successful food production are one of the benefits provided. Ecosystem services are provided to humans simply by the way natural systems function and include (among others) pollination, maintenance of soil structure and nutrient cycling. If ecosystem services are lost, which can follow as a consequence to loss of biodiversity, these important services might decrease. (Power, 2010) A decrease of ecosystem services can have severe ecological and economic consequences (Gallai et al, 2009).	<i>Ecosystem services Pollination Ecosystems</i>
<b><i>Nitrogen (N)</i></b>	Nitrogen is commonly used in food production as a fertilizer since it can enhance plant growth. The problem the substance causes is that it is rarely fully absorbed by the crops, which results in emissions to the atmosphere and pollution in water areas. (Rockström et al, 2009)	<i>Nitrogen</i>
<b><i>Phosphorus (P)</i></b>	Phosphorus works as a fertilizer for crops and has helped feed billions of people over the world. However, the substance is polluting water areas, causing eutrophication and is hence damaging ecosystems. Connected to the food industry, leakages of phosphorus from cropland is the primary source from which phosphorus ends up in freshwater ecosystems. Phosphorus is mined for use in agriculture and therefore there are currently predictions concerning that phosphorus is at risk for extinction, which is problematic since the substance is vital for the development of plant cells and has no other substitute.(Leal et al, 2019)(Rockström et al, 2009)	<i>Phosphorus</i>
<b><i>Land-system change</i></b>	Land-system change on a global level is driven primarily by agricultural expansion and the intensification of it. The change contributes to global environmental change, with the risk of undermining human well-being and long-term sustainability. The last 50 years, conversion from forest land to agricultural land has occurred at a rate of 0,8% a year, it is the major driver behind loss of ecosystem functioning and services. If it does not change, humanity will reach a tipping point for their actions that will seriously threaten biodiversity and risk Earth systems regulatory functions. (Rockström et al, 2009)	<i>Land-system change Land</i>

<b><i>Eutrophication</i></b>	Eutrophication is something that occurs due to the fact that large amounts of the plant nutrients, phosphorus and nitrogen, are released into soil and water areas. The main source of phosphorus and nitrogen originates from agriculture where the plant nutrients transfer from the soil through rainwater and eventually end up in the ocean. Eutrophication leads to changes in the ecosystems where some species rapidly increase, such as algal blooms. Other species are instead threatened to extinction, for instance by experiencing oxygen deficiency. Thus, the balance in the ecosystems is disturbed. (WWF, 2021)	<i>Eutrophication</i> <i>Overfertilization</i> <i>Fertilizer</i> <i>Mineral fertilizer</i>
<b><i>Acidification</i></b>	Acidification refers to a reduction in the pH of the ocean or the soil over an extended period of time. This is happening at a rate that is faster than ever before and is mainly caused by combustion of coal and oil, but modern agriculture and forestry also affects (Swedish agency marine and water Management, 2021). The process of how over use of nitrogen and phosphorus in agriculture affect the acidification of the ocean and the soil is complex. But the consequences of ocean acidification poses a challenge for marine biodiversity and the ability of oceans to continue to function as a sink of carbon dioxide. (Rockström et al, 2009)	<i>Acidification</i>
<b><i>Carbon dioxide emissions and climate change</i></b>	<p><i>Carbon dioxide emissions</i> are often highlighted in the environmental debate (Whitemen, 2013). Carbon dioxide emissions is the most common greenhouse gas, which alongside other greenhouse gases causes temperature rises and is hence disordering the balance of ecosystems. The changes in temperatures lead to changes in the climate, commonly referred to as <i>climate change</i> (WWF, 2021). Climate change is one of the planetary boundaries that has exceeded its limit, however not as severely as biosphere integrity and biogeochemical flows. (Rockström et al, 2009)</p> <p>Carbon dioxide emissions mainly originate from burning fossil fuels, but agricultural practises also contribute to the emissions. However in comparison, agricultural practises account for a relatively small proportion. (WWF, 2021)</p>	<i>Carbon Dioxide Emissions</i> <i>Carbon Dioxide</i> <i>CO<sub>2</sub></i> <i>Climate change</i>

*Table 7. Definition of scientific concepts*

## Appendix 2 - Swedish version of the CONI-model

Presented below are the head-categories, subcategories and search words used in the

<b><u>Head-categories</u></b>	<b><u>Subcategories</u></b>	<b><u>Sökord</u></b>
<b>Planetära Gränser</b>	<b>Planetens gränser</b>	Planetens gränser Planet Miljömål Miljömässig - syftar till miljömässiga gränser/risker/krav
<b>Biosfärintegritet</b>	<b>Biologisk mångfald</b>  <b>Ekosystemtjänster</b>  <b>Förändrad markanvändning</b>	Biologiskt mångfald Arter Utdöende Utrotning  Ekosystemtjänster Ekosystem Pollinering  Markanvändning Mark
<b>Biogeokemiska flöden</b>	<b>Kväve</b>  <b>Fosfor</b>  <b>Näringsämne</b>    <b>Övergödning</b>	Kväve  Fosfor  Näringsämne Konstgödsel Mineralgödsel Gödsel - i rätt kontext Gödselämne  Övergödning Utlakning Jordbruk - i rätt kontext Odling - i rätt kontext Erosion Förurning
<b>Kategori för jämförande miljöfokus</b>	<b>Klimatförändringar</b> <b>Koldioxid</b>	Klimatförändringar Koldioxidutsläpp Koldioxid CO <sub>2</sub>

Table 8. The chosen head-categories, subcategories and search words in Swedish



### Appendix 3- English Examples in the Qualitative research

Presented below are examples of findings for each score-level that refer to the search word *ecosystem* in the sub-category *ecosystem services*.

Score level	Definition	Example from the reports
1	Disclosure addresses the issues related to category; Pure narrative	“We work to preserve and promote ecosystems and biodiversity by supporting Swedish and local food producers, particularly Swedish meat production.” (Bergendahls, 2020)
2	Disclosure addresses issue related to category and provides details; Pure narrative	“Impacts on the ecosystems primarily occur in the cultivation and production of raw materials and food, i.e. outside of Lidl's direct operations and control. Such impacts are, for example, climate change, eutrophication and depletion” (Lidl, 2020)
3	Disclosure addresses issue related to category in numerical way or include qualitative explanations of the issue; Narrative or Quantitative	“An important aspect concerns all the ecosystem services where both forestry and agriculture have important roles. The work of purifying air and water as well as being a sink for carbon dioxide is not reported on today, neither as a plus nor as a minus post. We must change this, not only to stimulate agriculture in the direction of lower fossil fuel use, but also to radically decrease leakage of nutrients and carbon dioxide, where we must begin to build up carbon in the soil.” (Axfood, 2020)
4	Disclosure addresses issue related to category in numerical way, including qualitative explanations; Narrative and Quantitative	“Productions that involve high risk concerning ongoing deforestation or land-system change, which have not committed to preserving all forest and/or preserving natural ecosystems, . . . , get a 5 in score. Meat production in Brazil and shrimp production in Vietnam were two such examples of productions with the score 5, where the productions are to be phased out if they cannot verify that they have taken actions to handle the risk properly.” (Coop, 2021b)
5	Any numerical disclosure to the category including qualitative statements demonstrating year comparisons; Narrative, quantitative and comparable	<b>No examples were found.</b> To reach the fifth score, information should include all aspects of the fourth level, and in addition, also present comparisons between different years.
0	Not mentioning the category	-

Table 5. The Score- levels of the CONI-model with examples in English

## Appendix 4 - Swedish Examples in the Qualitative research

Presented below are examples of findings for each score-level, in the original language Swedish, that refer to the search word *ekosystem* in the sub-category *ekosystemtjänster*.

Score - Level	Definition	Exempel
1	Disclosure addresses the issues related to category; Pure narrative	“Vi arbetar för att bevara och främja <b>ekosystem</b> och biologisk mångfald genom att stödja svenska och lokala livsmedelsproducenter, inte minst svensk köttproduktion.” (Bergendahls, 2020)
2	Disclosure addresses issue related to category and provides details; Pure narrative	“Sådan påverkan är till exempel klimatförändring, övergödning och utfiskning. Påverkan på <b>ekosystem</b> sker primärt i odling och framställning av råvaror och livsmedel, det vill säga utanför Lidl's direkta verksamhet och kontroll.” (Lidl, 2020)
3	Disclosure addresses issue related to category in numerical way or include qualitative explanations of the issue; Narrative or Quantitative	“En viktig aspekt rör alla de <b>ekosystemtjänster</b> som både skog och jordbruk svarar för. Arbetet att rena luft och vatten och vara en sänka för koldioxid redovisas inte idag, vare sig som plus- eller minusposter. Detta måste vi ändra på, inte minst för att stimulera jordbruket i riktning mot inte bara lägre fossilanvändning utan att radikalt minska läckagen av näringsämnen och koldioxid och börja bygga kol i marken..” (Axfood, 2020)
4	Disclosure addresses issue related to category in numerical way, including qualitative explanations; Narrative and Quantitative	“Produktion som innebär en hög risk för pågående avskogning eller markomvandling, som ej åtagit sig bevara all skog och/eller naturliga <b>ekosystem</b> samt andra höga bevarandevärden (HCV 16) får fast score 5. Till dessa räknas bland annat köttproduktion i Brasilien samt rökodling i Vietnam. Denna risk har identifierats av Hållbar Livsmedelskedja som produktion som vi behöver fasa ut. Om leverantören kan verifiera att de hanterar denna risk på ett god tagbart sätt så kan de få 1 från utfallet.” (Coop, 2021b)
5	Any numerical disclosure to the category including qualitative statements demonstrating year comparisons; Narrative, quantitative and comparable	Inget resultat hittades.
0	Not mentioning the category	-

Table 6. The Score- levels of the CONI-model with examples in Swedish

## Appendix 5 - Citation from Ecosystem services in Swedish

Fullständig information till citatet i *Ekosystemtjänster* under huvudkategori *Biosfärsintegritet*.

“

### **Datakällor och indelning av score**

EPI tas fram av Yale University och Columbia University tillsammans med World Economic Forum. I EPI bedöms 24 indikatorer (ex trädförlust), indelade i 10 kategorier (ex. skog) inom 2 politiska mål (ex. ekosystemets livskraft/vitalitet). Beroende på hur stor betydelse de bedömt att en kategori/indikator har för miljöutmaningarna tilldelas den en procentandel som den står för i den slutgiltiga poängen. I vår bedömning har vi valt att inkludera 9 indikatorer som ingår i kategorierna; Biodiversitet & habitat, skogar och fisken men använt samma viktningsmodell (Appendix 1).

Produktion som innebär en hög risk för pågående avskogning eller markomvandling, som ej åtagit sig bevara all skog och/eller naturliga ekosystem samt andra höga bevarandevärden (HCV 16) får fast score 5. Till dessa räknas bland annat köttproduktion i Brasilien samt räkodling i Vietnam. Denna risk har identifierats av Hållbar Livsmedelskedja som produktion som vi behöver fasa ut. Om leverantören kan verifiera att de hanterar denna risk på ett godtagbart sätt så kan de få 1 från utfallet.

Odling av soja och palmolja orsakar på många håll i världen stora förluster av biologisk mångfald genom avskogning samt i vissa fall på grund av den höga bekämpningsmedelsanvändningen. Den absolut största andelen (80%) av sojan som odlas går till djurfoder. Palmolja, soja och alla animalier (kött och mejeri) bedöms som riskprodukter inom parametern och får +1 utöver utfallet för ursprungslandet.” (Coop, 2021b, s.5)

## Appendix 6 - Citation from Land-system change in Swedish

Fullständig information till citatet i *förändrad markanvändning* under huvudkategori *Biosfärsintegritet*.

“Våren 2017 började vi på Axfoundation provodla olika proteingrödor på testgården Torsåker. Det var sötlupin, gråärta och åkerböna. I vårt experimentkök tog vi fram nya produkter på dessa baljväxter. Visionen var att vår mat inte bör äta vår mat — idag går cirka 70 procent av all **åkermark** åt till att odla djurfoder. Vi ville hitta alternativ till soja eftersom den växer dåligt här och istället odlas på andra sidan jordklotet. Dessutom ofta på ett sätt som skadar både naturen och människorna i produktionen.” (Axfood, 2020, s.24)

## Appendix 7- Citation from Eutrophication in Swedish

Fullständig information till citatet i *Övergödning* under huvudkategori *Biogeokemiska flöden*.

“**Övergödning** uppstår på grund av utsläpp av för mycket **växtnäringsämnen** i mark och vattendrag, där jord och skogsbruket idag står för den största delen. Resultatet av den ökade tillförseln av kväve och fosfor blir att vattendrag, sjöar och kustecosystem förändras med bland annat en ökad produktion av växtmaterial. Ett exempel på detta är den onaturligt kraftiga algbloomingen i Östersjön där ett fåtal anpassningsbara arter tar då över och får extra skjuts av de näringsämnen som tillförs och den biologiska produktionen skenar. Det finns odling/uppfödning enligt certifieringar och **odlingssystem** som minimerar läckage av **växtnäring** till omgivande miljö t.ex. genom precisionsanpassad **gödsling**, skyddszoner, spridningstidpunkt, plöjningsfri **odling** och fångstgrödor. Som bedömningsgrund för utfallet i parametern **övergödning** används World banks data på försäljning av **mineralgödsel** per land.” (Coop, 2021b, s.8)