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MASTER THESIS

THE POWER OF THE FORK

Animal Agriculture as One of the Major Contributors to Climate Change and Its Impact on Global Sustainability

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Abstract

De aarde is ongeveer 4,6 miljard jaar oud en tijdens deze periode hebben er ontelbare natuurlijke klimaatveranderingen plaatsgevonden (Powell, 2001). Het is dus veilig om te stellen dat het klimaat nooit stabiel is geweest. Het grote verschil met de dag van vandaag is dat het klimaat niet meer enkel verandert als gevolg van natuurlijke oorzaken, maar ook meer en meer door verscheidene menselijke activiteiten. Het staat buiten kijf dat de huidige snelheid in toename aan de hoeveelheid broeikasgassen (voornamelijk $CCCC_2$) in de atmosfeer, alsook de toename van de gemiddelde temperatuur het gevolg zijn van een verhoogde uitstoot van $CCCC_2$ door menselijke activiteiten wat tot gevolg heeft dat de natuurlijke opslag van $CCCC_2$ (in oceanen en biomassa) en de natuurlijke evenwichten in de koolstofcyclus worden verstoord (Steinfeld et al, 2006). Deze verhoogde concentraties aan broeikasgassen in de atmosfeer versterken het natuurlijke broeikaseffect en noemen we het menselijk broeikaseffect wat globale klimaatverandering tot gevolg heeft (Climate Challenge, 2013).

We kunnen er niet om heen, de gewijzigde klimaatomstandigheden kan de mensheid leiden naar een ernstige crisissituatie. De verwachte effecten van klimaatverandering, waaronder hogere temperaturen, meer frequente en extreme weersomstandigheden, watertekorten, stijgende zeespiegel, landafbraak, verstoring van ecosystemen en verlies van biodiversiteit, zullen hoogstwaarschijnlijk grote gevolgen hebben voor onze toekomstige generaties. Deze realisatie resulteerde in verschillende onderzoeken naar de oorzaken van deze klimaatveranderingen. Het is echter frappant dat de vleesindustrie, meer bepaald de productie van vlees en andere dierlijke producten, vrijwel nooit mee in dit lijstje van oorzaken wordt gezet. Nochtans hebben verschillende studies reeds aangetoond dat de productie van vlees en andere dierlijke producten wel degelijk een impact hebben op het milieu. Het is zelfs zo dat de vleesindustrie aanzien wordt als één van de belangrijkste bijdragers aan klimaatverandering door de uitstoot van broeikasgassen, maar ook door ontbossing, bodemdegradatie, watertekorten en algemene milieuvervuiling (Wu, 2014).

Ondanks de omvang van het probleem en het reeds bestaande bewijs van de milieu-impact van de productie van dierlijke producten, bestaan er relatief weinig wereldwijde en nationale beleidsmaatregelen die de milieueffecten van de vleesindustrie reguleren, en diegene die wel bestaan blijken in praktijk onvoldoende (Hyner, 2015). Klimaatverandering vormt een belangrijke en groeiende bedreiging voor de globale voedselzekerheid (FAO, 2016b). Er is dringend actie nodig om de productie van gewassen, vleesproducten en de visserij aan te passen met het oog op een vermindering van de uitstoot van broeikasgassen die verantwoordelijk zijn voor de opwarming van de aarde (FAO, 2015). Om effectief de weg naar een duurzame toekomst te banen moeten de problemen gerelateerd aan de productie van vlees en andere dierlijke producten dringend in acht genomen worden.

Keywords: animal agriculture, climate change, global sustainability, governance

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List of Abbreviations

COP	Conference of Parties
EWG	Environmental Working Group
FAO	Food and Agriculture Organization of the Unites Nations
GDP	Gross domestic product
GHG	Greenhouse gases
GISS	NASA's Goddard Institute for Space Studies
GMO	Genetically Modified Organism
GMST	Global-mean surface temperature
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IWMI	International Water Management Institute
LCA	Lifecycle Assessment
MDG	Millennium Development Goals
MEA	Millennium Ecosystem Assessment
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration.
ppm	Parts per million
SAFA	Sustainability Assessment of Food and Agriculture Systems
SDG	Sustainable Development Goals
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WWF	World Wildlife Fund

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Acknowledgments

This paper is a result of a personal interest in environmental affairs that began many years ago and with an idea that turned into my master thesis. Over the years, many people, from authors and filmmakers to random people on the street, have helped shape my ideas on the importance of protecting our environment. To them I am sincerely grateful. I also want to thank Wilke Jansoone for her wisdom and guidance and for always helping me when I most needed it, Iñaki De vocht, my partner and friend, whose love sustains me, my friends and family who have and continue to support me and the University of Antwerp for providing me with the opportunity to carry out research on a subject dear to me.

Above all, I would like to express my deep appreciation and indebtedness particularly to my promotor, Dr. Ivan Janssens and co-promotor, Dr. Dirk De Bièvre. The completion of this undertaking could not have been possible without their participation and assistance. Dr. De Bièvre aided in helping me frame the subject, I was very much interested in, in the context of international relations, whereas Dr. Janssens, a biologist with expertise in the fields of climate change, carbon and nutrient cycling and global changes, provided me with information on environmental affairs as well as the impacts of the animal agriculture sector on our atmosphere and on the responsibility of animal agriculture in meeting global sustainability challenges. Their contributions are greatly appreciated and gratefully acknowledged.

Tessa Jansoone
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1. Introduction

> *The atmosphere is fundamental to life on earth. Besides providing the air we breathe, it regulates temperature, distributes water, it is a part of key processes such as the carbon, nitrogen and oxygen cycles, and it protects life from harmful radiation. All of these functions are orchestrated in a fragile dynamic equilibrium by complex atmospheric physics and chemistry. (Steinfeld et al., 2006: 79)*

Lately, increasing evidence shows that human activity is altering mechanisms of the atmosphere, causing what is known as anthropogenic climate change. The idea that humans can and are in fact changing the climate of our planet has developed gradually over the years. These anthropogenic climate changes were seen as a fringe idea in the nineteenth and early twentieth centuries (Arrhenius, 1896) and were close to a well-established scientific consensus at the turn of the twenty-first century (IPCC, 2001). During the history of this development, the initially eccentric concept of human-caused global warming has won over practically every skeptical climatologist who has cared to look unbiased at the evidence (Rahmstorf, 2008: 34).

The beginning of the Industrial Revolution in the 1800s caused greenhouse gas emissions to rise dramatically. Many greenhouse gas emitting activities are now essential to the global economy and a fundamental part of modern life (UNFCCC, 2000). One of those greenhouse gas emitting activities is the breeding, maintenance, and slaughter of animals, known as animal agriculture or factory farming. It is a component of modern agriculture that has been practiced in many cultures since humanity's transition to farming from hunter-gatherer lifestyles and it is a trend that is ever-increasing. Today, the expanding animal agriculture sector lays hands on natural resources that come at a significant environmental cost.

Ethical motivations in the sense of animal rights along with health concerns and, though significantly smaller, environmental concerns have created a movement promoting a vegetarian or vegan lifestyle (Gorman, n.d.). The practice of vegetarianism or veganism has been one of the most controversial and, arguably, one of the most debated subjects ever since its inception and mankind has not been able to decisively arrive at a “right” conclusion to this controversy (Pandian, 2016). For people who inhabited earth during the hunter-gatherer lifestyle period, there was no choice; they needed to hunt in order to get food and survive. Nowadays, the situation is very different, the unprecedented increase in population and the alarming rise in the depletion of natural resources plus an increase in the demand for food (Steinfeld et al., 2006), have transformed it from being a matter of choice to a perilous issue that needs to be addressed urgently. It has become a subject of debate that the industrialization of animal agriculture has grown to be a threat to the sustainability and survival of our planet and the human race (Pandian, 2016).

Studies have identified animal agriculture as a significant contributor, arguably the most significant, to climate change and to a variety of pressing environmental issues (Hyner, 2015). The expected effects of climate change – higher temperatures, more frequent and extreme weather events, land degradation, the disruption of ecosystems, water shortages, rising sea levels and the loss of biodiversity – could have a major impact on our future generations. But despite the magnitude of the problem, and the substantial proof of the environmental impact related to the production of meat and other animal-derived products, relatively few global and national policies

addressing the environmental effects of animal agriculture exist, and those that do exist are usually grossly inadequate (Hyner, 2015). In order to effectively pave a path towards a sustainable future this issue needs to be addressed. With increased prosperity, people are consuming more meat and dairy products every year. Global meat production is projected to more than double from 229 million tons in 1999/2001 to 465 million tons in 2050, while milk output is set to climb from 580 to 1 043 million tons (FAO, 2006a & Steinfeld et al., 2006: 275). Action is urgently needed, therefore, to prepare crop and livestock production, fisheries and forestry for the prospect of rapidly changing environmental conditions and to reduce agriculture's own contribution to the greenhouse gas (GHG) emissions, amongst other factors, contributing to global warming (FAO, 2015). And for that to happen we need to start making conscious decisions and take our impact on the environment into account. The aim of this thesis is to provide the reader with information on all areas of sustainability affected by the production process of the animal agriculture sector and to underline that the mismanagement of information regarding the environmental implications of animal agriculture by various decision-making organizations need to be addressed in order to develop proper global strategies aimed at reducing environmental degradation.

Below, you will find an analysis of the different impacts of the animal agriculture sector on the environment. I have borrowed liberally from academics, organizations, journalists, and policy analysts who have contributed to the debate on the impact of animal agriculture on the environment. However, on issues where others have, arguably, kept silent, or been inconsistent, my aim is to impose consistency in the interest of clarity. The purpose is not advocacy; it is transparency. I am hoping to be able to sharpen the public debate, not necessarily settle it. The intent of this thesis is to provide an informational base upon which readers can be afforded the opportunity to increase their awareness of food choice as it affects the sustainability of the planet we call home.

2. Theoretical Framework

This chapter describes the theoretical framework in which this thesis research will take place. It contains background information as well as the research question and sub-questions, a review of research objectives, the significance of the study and the research methodology including the research's scope and limitations. This chapter will also provide a general outline of this thesis.

2.1. Background

As stated in a report from the United Nations Food and Agriculture Organization:

> *The rapid change in the world's climate is translating into more extreme and frequent weather events, heat waves, droughts and sea-level rise. The impacts of climate change on agriculture and the implications for food security are already alarming. Unless action is taken now to make agriculture more sustainable, productive and resilient, climate change impacts will seriously compromise food production in countries and regions that are already highly food-insecure. Through its impacts on agriculture, livelihoods and infrastructure, climate change threatens all dimensions of food security. (FAO, 2016b)*

It is clear that the world faces an unprecedented challenge – namely to stabilize global climate and limit the repercussions of climate change. The scientific evidence of the deepening environmental crisis keeps growing and climate change is happening faster than scientific models had predicted (FAO, 2016b). Therefore, nations around the world are upping their game in the fight against climate change. Various climate conferences have taken place, but it is the *Paris Climate Change Conference* in 2015 that is described to be the most historical. Of 197 parties to the convention, 147 parties have ratified an agreement to reduce their carbon emissions with the goal of limiting future warming to well below 2°C (UNFCCC, n.d.).

Lately, the international community is taking more responsibility for building a sustainable future. Their efforts are apparent in adopting the goals of the 2030 Agenda on Sustainable Development and the Paris Agreement on Climate Change. However, meeting these Sustainable Development Goals (SDGs), while addressing the threat of climate change, will require a transformation of food and agricultural systems worldwide. To this end, enabling agriculture, forestry and fisheries to adopt climate-friendly practices is of utmost importance (FAO, 2015). In the words of José Graziano da Silva, FAO Director-General: *'Business as usual is not an option. Agriculture has always been the interface between natural resources and human activity. Today it holds the key to solving the greatest challenge facing humanity: maintaining a stable climatic corridor in which civilization can thrive.' (FAO, 2016b)*

2.2. Research Project – Problem Statement

Although meat production and export could be economically beneficial in the short run, it can lead to over-exploitation of natural resources and, in turn, to the destruction of the environment in the long run (UNEP, 2010). Hence, it is essential for the leaders of a nation to make smart decisions when it comes to economic policies, especially while dealing with resource intensive economic sectors such as animal agriculture. However, striking the right balance between the economic benefits and resulting trade-offs in the environmental realm is possible only through well-informed decisions (Pandian, 2016). Information is key and many people are still very much misinformed when it comes to their consumption patterns and are unaware of the fact that the meat and other animal products they consume have an impact on the environment as well (Oppenlander. 2012). Especially in times when so much attention is raised on how to reduce your ecological footprint, within the framework of climate change still very little is mentioned on the subject of animal agriculture, which could be considered a grave mistake since several studies have shown that animal agriculture is one of the major contributors to climate change due to greenhouse gas emissions, but also to land degradation, deforestation, freshwater shortages and general environmental pollution (Wu, 2014 & Pandian, 2016).

A report from the United Nations Food and Agriculture Organization (FAO) predicted that:

> *In order to keep the increase in global temperature below the crucial ceiling of 2°C, emissions will have to be reduced by as much as 70 percent by 2050. Keeping climate change within manageable levels can only be achieved with the contribution of the agriculture sectors. Since they are one of the major contributors to the total amount of greenhouse gas emissions, mainly from the conversion of forests to farmland as well as from livestock and crop production. The challenge is to reduce those emissions while meeting an unprecedented demand for food.' (FAO, 2016b)*

When talking about climate change it has become clear that the main focal point in mitigation efforts is the reduction of greenhouse gas (GHG) emissions. In the minds of the masses climate change goes hand in hand with greenhouse gas emissions resulting from fossil fuels. In mitigation efforts, those fossil fuel emissions take the number one spot when designing policies to reduce the impact on the environment, which is of course a very good starting point. However, several studies have shown that the animal agriculture sector has an enormous impact on the environment as well. It is said that animal agriculture is responsible for 18 percent of all greenhouse gas emissions, which is more than all transportation combined (Andersen & Kuhn, 2014). So then, how come this is not properly addressed? And when greenhouse gas emissions are discussed, so little is said about the contribution of the animal agriculture sector to GHG emissions.

2.3. Research Objectives

The following are the primary objectives of this thesis.

- To study the impact of the animal agriculture sector on the environment by investigating relevant existing literature. The main sources used were those provided by governmental organizations including FAO, IPCCC, UNFCCC. The 2006 report *Livestock's Long Shadow*, released by the Food and Agriculture Organization (FAO) of the United Nations, was the main source in investigating the environmental impacts resulting from animal agriculture activities.
- To develop relevant statements based on the outcomes and learnings from the literature and review the information in order to formulate an answer to the research question.
- To collect the necessary data through a survey research in order to support the research question.
- To evaluate and interpret the results of the conducted survey research.
- To develop a general conclusion as well as the scope for improvement and further areas of investigation.

2.4. Research Question

The purpose of this secondary literature research and survey research study is to determine to what extent people are aware of issues related to climate change and whether or not people believe that animal agriculture has an impact on the environment. The research question is as follows:

What is the environmental impact of animal agriculture?

Another objective of this thesis is to find out whether or not people believe they are being properly informed by governments and the media on all aspects impacting the environment, including the environmental impact of the production process and consumption of meat and other animal-derived products. In order to provide a more in-depth answer to the research question, a survey was conducted. The intent of the survey is to aid in providing a clearer answer to the research question and to verify if people are aware of the environmental impact of their food choices and to what extent people are aware of the issues surrounding climate change in general as well as those issues related to animal agriculture. The survey contains 38

questions and deals with the following sub-questions (further discussed and analyzed in section 5.2):

- Is human activity a contributing factor to any increase in global temperatures (anthropogenic climate change)?
- Has the seriousness of global climate change been generally exaggerated, correct, or is it underestimated?
- Do food consumption habits also have an environmental impact?
- Could choosing not to eat beef and milk also have an impact in helping to fight climate change?
- Are governments and the media addressing all impact related to environmental degradation; more specifically the environmental impact of the consumption habits of animal products?
- Will changing individual lifestyle practices have an effect on limiting one's individual environmental impact (ecological footprint)?

2.5. Significance of the Study

The animal agriculture sector has social, economic and political significance. It employs 1.3 billion people, creates food for humans around the world and livelihoods for one billion of the world's poor (Naqvi & Sejian, 2011). FAO's 2006 report *Livestock's Long Shadow* stresses that:

> *Growing populations and incomes, along with changing food preferences, are rapidly increasing the demand for livestock products, while globalization is boosting trade in livestock inputs and products. Global production of meat is projected to more than double from 229 million tons in 1999/2001 to 465 million tons in 2050, and that of milk to grow from 580 to 1 043 million tons. (Steinfeld et al., 2006: 275 & FAO, 2006a)*

The animal agriculture sector has a substantial impact on the world's water, land and biodiversity resources and contributes significantly to climate change. And since climate change poses a major and growing threat to global food security (FAO, 2016b), it is important that people around the world are properly informed about the effects of their consumption patterns on the environment. Yet, it has become clear that the effects of animal agriculture are frequently under-addressed (Oppenlander, 2012), but, in order to really curb the effects of climate change, our food consumption patterns, mainly the consumption of meat and other animal-derived products, need to be properly assessed. Action is urgently needed to prepare crop and animal agriculture production, fisheries and forestry for the prospect of rapidly changing environmental conditions and to reduce agriculture's own contribution to the greenhouse gas (GHG) emissions responsible for global warming (FAO, 2015). Better policies in the animal agriculture sector are not only an environmental requirement but also a social and health necessity.

A major motivation for this research is that the environmental issues linked to animal agriculture have not generally received an adequate institutional response (Steinfeld et al., 2006: 4). The production processes associated with the animal agriculture sector are

increasingly modified and standardized, causing environmental impacts to swiftly change. Public policies, in developed and developing countries alike, barely keep pace with rapid transformations in production technology and structural shifts in the sector. It is a recurring trend that environmental laws and programs are usually put in place only after significant damage has already occurred. (Steinfeld et al., 2006: 4)

2.6. Research Methodology

Regarding the type of research, this research involves the collection of existing data. This is because, data on animal agriculture required for this research already exists and has been collected by reliable sources, including organizations such as the United Nations (UN) and the Food and Agriculture Organization (FAO). Hence, this research is a secondary research. However, in addition, I have assembled a survey. A descriptive, survey research design was chosen with the intent to aid in providing a clearer answer to the research question and to verify if people are aware of the environmental impact of their food choices, whether or not they believe that governments and the media are providing information on all aspects linked to environmental degradation (including the impacts of animal agriculture) and to find out to what extent people are aware of the issues surrounding climate change in general as well as those issues related to animal agriculture.

Regarding the objective of the research, this research involves the study of human behavior in relation to their meat consumption patterns and general impact on the environment through the analysis of relevant literature and a survey. Hence, it is a qualitative research.

Regarding the form of research, the objective of this research is to inform people on the environmental impact of the animal agriculture sector and that this sector needs to be properly taken into account when designing policies aimed at reducing climate change. The aim is the identification of issues regarding animal agriculture and issues in policy-making with regard to the animal agriculture sector. Hence, this an explanatory research.

Regarding the style of reasoning for research, this research involves the derivation of statements based on an extensive literature review on the subject and the examination of facts and evidence from previous research. It starts with the big picture of climate change and then further breaks it down from there into smaller segments looking into the animal agriculture sector and its impacts on the environment. Hence, this research follows a top-down approach and is therefore based on deductive reasoning as opposed to inductive reasoning.

To summarize, this is a secondary, qualitative, explanatory research that uses the deductive reasoning approach to analyze existing literature with the inclusion of a survey research analysis.

2.7. Scope and Limitations

This research involves the examination of the research question by using a secondary literature research and descriptive survey design approach.

2.7.1. Advantages

- A lot of the information already exists and is readily available.

- A secondary literature research approach helps guide the focus of further research.
- Secondary research is often the only available source of specific pieces of information (i.e. government data).

2.7.2. Limitations

- There is a possibility that some of the secondary literature information lacks specificity or does not exactly address questions of concern.
- Some external secondary data may be of suspect quality or outdated.

2.7.3. Assumptions (survey)

- The respondents provided accurate demographic information when answering the survey questions.
- The respondents were honest and reflective in their responses to the survey questions.
- The survey was accessible to all respondents via email or Facebook.
- The intended recipient answered the survey only once.

2.8. Document Outline

This thesis comprises of 6 main chapters, a bibliography and annexes. The objectives of each of these chapters are as follows:

- Chapter 1 provides introductory information on the subject of this thesis research.
- Chapter 2 provides the theoretical framework containing background information, including the purpose and research objectives, as well as the significance of the study and the research methodology.
- Chapter 3 provides an extensive overview of the existing literature that is relevant to this research. It establishes the theoretical basis for the formulation of an answer to the research question by presenting facts and evidence from other scientific research.
- Chapter 4 provides the road map followed to answer the research question. It will also establish the outlines of the survey while looking into the research question and its sub-questions.
- Chapter 5 derives statements based on the information presented in chapter 3 and aims to assess the results obtained from the survey research.
- Chapter 6 will conclude the research and provide an overview of the overall work carried out. The scope for improvement and further areas of investigation will also be highlighted in this chapter.

3. Literature Review

This chapter contains the review of the relevant literature for this thesis. It intends to provide the reader with facts and projections on the issues surrounding the problem under consideration and thereby provide a strong basis for the research question.

In short, the chapter answers the following questions.

- What is the impact of animal agriculture on different problems faced by humanity and the planet today?
- How come so little is said on the impact of animal agriculture on the environment while the main focus of mitigation is usually only limited to reducing fossil fuels or providing new reusable energy sources?
- What are the issues faced in policy-making with regard to the animal agriculture sector?
- How do these come together to answer the research question?

The figure below provides a view of the topics covered in this chapter.

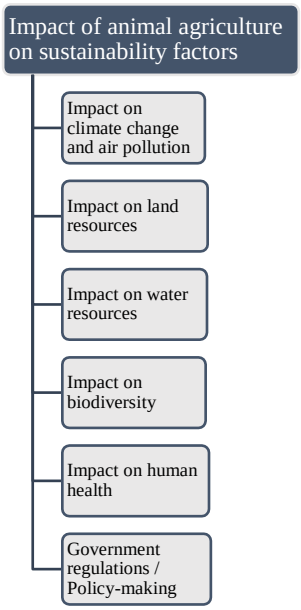


Figure 1: Chapter Overview

3.1. Anthropogenic Climate Change

Anthropogenic climate change has increasingly become a well-established fact and the resulting impacts on the environment are already being observed. The greenhouse effect is a key mechanism of temperature regulation. According to FAO's *Livestock's Long Shadow* report:

> *Without it, the average temperature of the earth's surface would not be 15°C but rather -6°C. The earth returns energy received from the sun back to space by reflection of light and by radiation of heat. A part of the heat flow is absorbed by so-called greenhouse gases, trapping it in the atmosphere. The principal greenhouse gases involved in this process include carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). (Steinfeld et al., 2006: 82)*

Since the beginning of the industrial period, anthropogenic emissions have led to an increase in concentrations of these gases in the atmosphere, resulting in global warming (Steinfeld et

al., 2006: 82). According to an ongoing temperature analysis conducted by scientists at NASA's Goddard Institute for Space Studies, the average global temperature on earth has increased by about 0.8° Celsius since 1880 (GISS, n.d.). Two-thirds of the warming has occurred since 1975, at a rate of roughly 0.15°C to 0.20°C per decade (GISS, n.d.).

3.1.1. Mean Global Temperature Anomaly

Global-mean surface temperature (GMST) is the most important indicator of global climate change because it is directly related to the planetary energy balance (Fourier, 1827) and increases quasi-linearly with cumulative greenhouse gas emissions (IPCC, 2013). GMST is measured through the use of global temperature anomalies (NOAA, 2017a) and can be utilized to determine certain climate change impacts and risks (Arnell et al., 2014). Hence there is a large interest in the time evolution of GMST, both in the scientific community and the general public (Boykoff, 2014).

Thermometer readings all around the world have had periods of ups and downs, but lately a steady rise is observed. This is illustrated through the use of the global temperature anomaly, which is defined as *'a global-scale climate diagnostic tool that provides a big picture overview of average global temperatures compared to a reference value'* (NOAA, 2017a). The term temperature anomaly implies that the calculations depart from a reference value or long-term average instead of the use of absolute temperatures. According to a global surface temperature anomalies analysis conducted by the NOOA (National Oceanic and Atmospheric Administration):

> *The reason for only using temperature anomalies is because absolute estimates of global average surface temperature are difficult to compile for several reasons: (a) some regions have few temperature measurement stations (e.g. the Sahara Desert) and interpolation must be made over large, data-sparse regions and (b) in mountainous areas, most observations come from the inhabited valleys, so the effect of elevation on a region's average temperature must be considered as well. By using reference values computed on smaller (more local) scales over the same time period establishes a baseline from which anomalies are calculated. This effectively normalizes the data so they can be compared and combined to more accurately represent temperature patterns with respect to what is normal for different places within a region.' (NOAA, 2017a)*

It is for these reasons that climate variability over larger areas can be described more accurately then they would be through the use of absolute temperatures. Not only that, anomalies also give a frame of reference that allows more meaningful comparisons between locations and, therefore, more accurate calculations of temperature trends (NOAA, 2017a). On the next page you will find maps illustrating the changes in global temperature across a timeframe from 1880 to 2016 (See Figures 2 – 7).

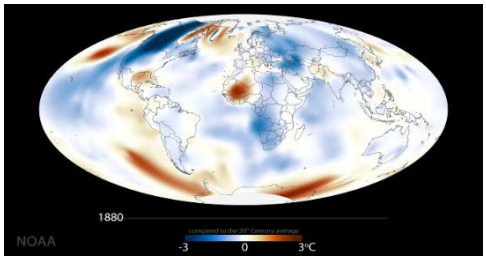


Figure 2: Annual temperature for the year 1880 compared to the twentieth century average

Source: NOAA, 2017b

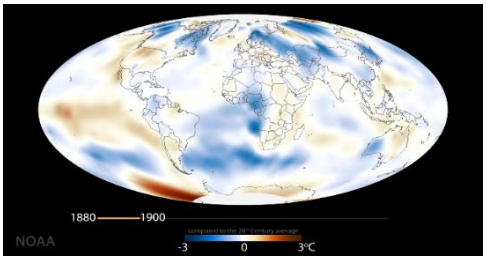


Figure 3: Annual temperature for the year 1900 compared to the twentieth century average

Source: NOAA, 2017b

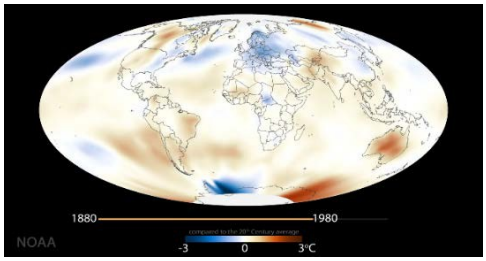


Figure 4: Annual temperature for the year 1980 compared to the twentieth century average

Source: NOAA, 2017b

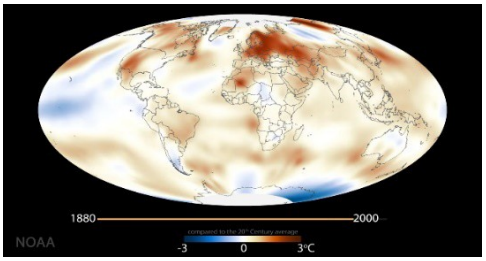


Figure 5: Annual temperature for the year 2000 compared to the twentieth century average

Source: NOAA, 2017b

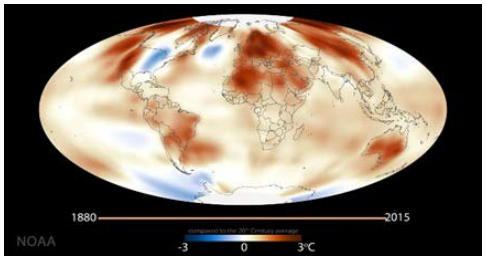


Figure 6: Annual temperature for the year 2015 compared to the twentieth century average

Source: NOAA, 2017b

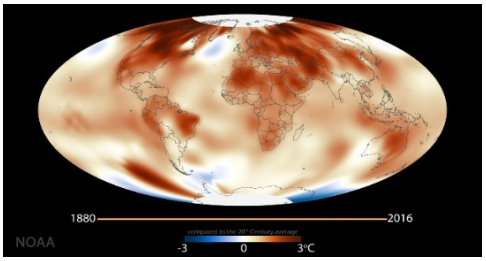


Figure 7: Annual temperature for the year 2016 compared to the twentieth century average

Source: NOAA, 2017b

Figures 2 to 7 illustrate the change in global surface temperature anomalies for the years 1880, 1900, 1980, 2000, 2015 and 2016 relative to the 20th century average temperatures.[1] Because of global warming due to increasing greenhouse gases, the maps from the late 1800s and the early 1900s are dominated by shades of blue, indicating temperatures were cooler than the twentieth-century average. By the 1980s, the maps take on shades of yellow, with a few large cooler-than-average spots shifting around. By the 2000s, most of the planet is orange and red – indicating it is warmer than the long-term average, with only a few isolated cool spots (NOAA, 2017b). When comparing figure 2 with figure 7, it is clear that

[1] *'The global temperature anomaly data is produced from the Smith and Reynolds blended land and ocean data set (Smith et al., 2008), which is an improvement to NOAA's Historical Merged Land-Ocean Surface Temperature Analysis. This data set consists of monthly average temperature anomalies on a 5° x 5° grid across land and ocean surfaces. These grid boxes are then averaged to provide an average global temperature anomaly. An area-weighted scheme is used to reflect the reality that the boxes are smaller near the poles and larger near the equator. Global-average anomalies are calculated on a monthly and annual time scale. Average temperature anomalies are also available for land and ocean surfaces separately, and the Northern and Southern Hemispheres separately. The global and hemispheric anomalies are provided with respect to the period 1901-2000, the 20th century average.' (NOAA, 2017a)*

the earth's surface has significantly increased in temperature; this is where the term *global warming* applies.

3.1.2. Global warming and its Effects

Human activities have resulted in present day concentrations of $CCCC_2$ and $CCCC_4$ that are unprecedented over the last 650 000 years of earth history (Siegenthaler, et al., 2005). The build-up of these gases has contributed to major global warming transitions at the earth's surface. Global warming is expected to result in changes in weather patterns, including an increase in global precipitation and changes in the severity and frequency of extreme weather events such as storms, floods and droughts (Steinfeld et al., 2006: 80). Mean sea level is expected to rise by 9 – 88 cm by 2100, causing flooding of low-lying areas and other damage. As a result, many ecosystems are at risk (Steinfeld et al., 2006: 80 & IPCC, 2001).

According to FAO's *Livestock's Long Shadow* report, the levels and impacts of climate change will vary considerably by region. Societies will face new risks and pressures. Food security is already threatened especially for those regions that are already suffering from yield declines in major crops and those already experiencing food shortages and hunger. *'Also water resources will be affected as precipitation and evaporation patterns change around the world. Physical infrastructure will be damaged, particularly by the rise in sea-level and extreme weather events. Additionally, economic activities, human settlements, and human health will experience many direct and indirect effects.' (Steinfeld et al., 2006: 80 – 81).*

3.2. The Agriculture Sector

> *Animal agriculture activities have a significant impact on virtually all aspects of the environment, including air and climate change, land and soil, water and biodiversity. The impact may be direct, through grazing for example, or indirect, such as the expansion of soybean production for feed for the animals replacing forests in South America. (Steinfeld et al., 2006: 3)*

The United Nations Food and Agriculture Organization initiated the SAFA (Sustainable Assessment of Food and Agriculture Systems) principle in order to look into the environmental impacts of different agricultural sectors, including the animal agriculture sector. They describe the purpose as well as the environmental impacts of the animal agriculture sector as follows:

> *The primary purpose of agriculture, forestry and fisheries is to produce the food, fibers and fuel that sustain and enhance the lives of human populations. As productive activities, they have and continue to transform the natural environment, modifying the functioning of natural ecosystems and impinging upon the characteristics of natural resources – from soil and water, to air and biodiversity. As productive activities, agriculture, forestry and fisheries have and continue to shape societies and entire ecosystems. (FAO, 2015)*

The impacts of agriculture, forestry and fisheries on natural resources and the environment are considerable. The technological developments of the last two centuries, and in particular those of the last fifty years responding to growing levels of demand, have increased the

environmental impact of the agricultural sector (FAO, 2015). Productivity gains have not been without environmental costs – the most notably being the overexploitation of finite (or very slowly renewable) resources. (FAO, 2015).

3.2.1. Animal Agriculture as a Major Player in Global Environmental Issues

Collectively, over 65 billion animals are raised, fed, watered, killed and eaten each year (Oppenlander, 2012). This is approximately 10 times as many people there are on earth. In doing so, these animals use and deplete renewable and non-renewable natural resources through the use of land, water, air, food and fossil fuels. During mankind's history, a complex system was developed which enabled the processing production of more and more animals that use more and more of the planet's resources, all the while leaving a massive amount of waste, pollution, and other adverse climate changing effects in their wake (Steinfeld et al., 2006: 4). This process is repeated year after year after year and is alarmingly increasing in volume and intensity. This system also has become complicated in that it is now heavily intertwined with our culture, politics, economics, and the suppression and mismanagement of the reality of its effects on our planet also play a role (Oppenlander, 2012: 41).

Using animals for food and other products and services is only one of many human activities that depend on natural resources (Steinfeld et al., 2006: 4). Humans are using the world's renewable natural resources at rates that increasingly exceed their natural abilities to renew themselves (Westing, Fox & Renner, 2011 & Steinfeld et al., 2006: 4). Humans introduce growing amounts of pollutants into the air, water and soil, at rates ever higher than the capacity of the environment to dissipate or decompose these pollutants (Global Footprint Network, n.d.). Below are some facts and figures with regard to the different impacts of the animal agriculture sector on sustainability factors described in FAO's *Livestock's Long Shadow* (Steinfeld et al., 2006: 5 – 6).

Climate Change / Air Pollution

While there are different views on the extent of climate change, its effect on the environment, and the extent of human activities as a contributing factor, it is a well-established fact that anthropogenic climate change is in fact occurring. Climate change means an increase in average temperature and studies have shown that it seems to be associated with an increased frequency of extreme weather events (Steinfeld et al., 2006: 5). The most common greenhouse gas associated with climate change is carbon dioxide ($CCCC_2$), but other greenhouse gases, including methane and nitrous oxide, amongst others also contribute to global warming. Carbon dioxide levels have increased over 40 percent, from 280 parts per million (ppm) to more than 400 ppm today (Climate Challenge, 2013). Measurements today show that $CCCC_2$ concentrations are higher than at any time during the last 650.000 years (Siegenthaler et al., 2005). Also methane concentrations are more than twice the pre-industrial level (Spahni et al, 2005). As a result, average temperatures have increased by 0.8°C over the past century (NASA, 2005).

Land

The animal agriculture sector is by far the single largest anthropogenic user of land and the leading cause in deforestation. FAO's *Livestock's Long Shadow* describes the impact on land as follows:

> *The total area occupied by grazing is equivalent to 26 percent of the ice-free terrestrial surface of the planet. In addition, the total area dedicated to feedcrop production amounts to 33 percent of total arable land. In all, livestock production accounts for 70 percent of all agricultural land and 30 percent of the land surface of the planet. The expansion of animal agriculture production processes is a key factor in deforestation, especially in Latin America where the largest amount of deforestation is occurring – 70 percent of previous forested land in the Amazon is occupied by pastures, and feedcrops cover a large part of the remainder with the majority of croplands used to produce feed for livestock. Not only deforestation is a major problem, another result of animal agriculture activities is land degradation, mostly through overgrazing, compaction and erosion created by livestock action.' (Steinfeld et al., 2006: xxi)*

Water

Agriculture is the largest user of water, accounting for 70 percent of total freshwater use. The world is moving towards increasing problems of freshwater shortage, scarcity and depletion, with 64 percent of the world's population expected to live in water-stressed areas by 2025 (Steinfeld et al., 2006: 5). Water availability is becoming a serious constraint to the production processes of several agricultural activities. Therefore, meeting growing human needs while facing water scarcity issues will prove to be very difficult.

Biodiversity

The loss of biodiversity continues to accelerate caused by continuous habitat losses, unsustainable forms of exploitation and climate change. In an analysis of the environmental health of the planet, the *Millennium Ecosystem Assessment* (MEA, 2005a), estimates that species are disappearing at 100 to 1000 times the levels seen in history records. While some species provide obvious services such as food or clothing, most species' services are more difficult to be seen and, therefore, less appreciated. They include recycling of nutrients, seed dispersal, climate control and purification of air and water which all contribute to the well-being and sustainability of the planet (Steinfeld et al., 2006: 5).

Human Health

Environmental degradation also affects human health, both directly as indirectly. FAO's *Livestock's Long Shadow* describes these effects as follows:

> *Direct effects on human health include contact with pollutants, whereas indirect effects include increased exposure of humans and animals to infectious diseases because of climate change. The geographic range and seasonality of a number of*

important diseases, including malaria and dengue fever, are sensitive to changes in climatic conditions which could pose threats to human health. (Steinfeld et al., 2006: 6 & UNEP, 2005)

As a whole, environmental degradation at its current scale and pace is clearly a serious threat to the sustainability of natural resources. The functioning of ecosystems, both at local and global levels, is already seriously compromised. Ultimately, if left unchecked, environmental degradation may threaten not only economic growth and stability but the very survival of humans on the planet (Steinfeld et al., 2006: 6). Since the animal agriculture sector affects a vast range of natural resources, it must be carefully managed given the increasing scarcity of these resources. Production processes associated with the animal agriculture sector requires attention and intervention so that the animal agriculture sector can have fewer negative and more positive impacts on national and global public goods (Steinfeld et al, 2006: 4).

3.2.2. Elements Influencing the Animal Agriculture Sector

The animal agriculture sector, along with food and agriculture in general, is undergoing a far-reaching technical and geographical change, much of it driven by factors outside the sector, which is shifting the balance of environmental problems caused by the sector (FAO, 2006c). (a) Growing populations and other demographic factors such as (b) age structure and (c) urbanization determine food demand and have driven intensification of agriculture for centuries. (d) Growing economies and individual incomes have also contributed to growing demand and shift in diets. (FAO 2006a).

All these trends have spurred a rapid increase in demand for animal products and other high value foodstuffs such as fish, vegetables and oils. The agriculture sector has responded to the increased and diversified demands for food items with innovations in biology, chemistry and machinery. These secular changes of population, economies, diets, technologies and land use drive changes in the global animal agriculture sector (Steinfeld et al., 2006: 6) and resulted in a geographical shift of animal agriculture production, first from rural areas to urban and peri-urban, to get closer to consumers; then towards the sources of feedstuff, whether these are feedcrop areas, or transport and trade hubs where feed is imported (Steinfeld et al., 2006: 6). Another trend is the one towards intensification instead of expansion as well as a shift of species, with production of monogastric species (pigs and poultry) growing rapidly, while the growth of ruminant production (cattle, sheep and goats) slows (Steinfeld et al., 2006: 6). *'Through these shifts, the animal agriculture sector enters into more and direct competition for scarce land, water and other natural resources' (Steinfeld et al, 2006: xx – xxi)*

Satisfying increasing and changing demands for animal food products, while at the same time sustaining the natural resource base (soil, water, air and biodiversity), is one of the major challenges facing world agriculture today. Global agriculture as a whole will be increasingly driven by trends in the animal agriculture sector, many of which are already

apparent and mentioned in a 2006 FAO report called *World agriculture: towards 2015/2050* (FAO, 2006a):

- An increasing proportion of livestock production will originate in warm, humid and more disease-prone environments.
- Pressure on, and competition for resources such as water will increase.
- There will be more large-scale industrial production, located close to urban centers, with associated environmental and public health risks.
- Pigs and poultry will increase in importance compared with ruminants.

3.2.2.1. Consumption Patterns

The evidence that we are consuming the resources that underpin ecosystem services much too fast, meaning faster than they can be replenished, is compelling (Global Footprint Network, n.d.). We are essentially living in a world of overproduction caused by overconsumption. In 2005, consumption was 30 percent greater than supply and August 13th 2015 marked the first earth "overshoot day" (Global Footprint Network, n.d.). This means that humanity is using more natural resources and emitting more carbon dioxide in the atmosphere than what the planet can replenish, resulting in a dangerous ecological deficit. The cost of overspending translates in soil erosion, climate change and other negative externalities that will have devastating effects on food production and human survival (FAO, 2015).

According to a 2015 FAO report:

> *Global population (estimated at more than 9.2 billion in 2050) and increasing purchasing power (with per capita incomes expected to rise by 3.5 percent per year over the next decades) of developing countries will dramatically increase global food demand. According to the current food system model, that comprises high levels of food waste, food production will need to increase, as compared to years 2005/2007 by around 60 percent by 2050 to meet the demand for food, water, fiber and energy.' (FAO, 2015)(see Figure 8)*

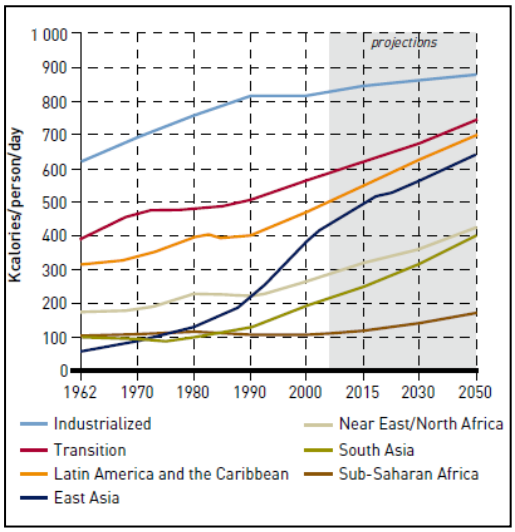


Figure 8: Past and projected food consumption of livestock products

Source: FAO, 2006a & FAO, 2006b

With the depletion of natural resources and increasing social asymmetries, the current trend of production and consumption progress cannot be considered sustainable, especially since the expanding animal agriculture sector lays hands on additional feed and land resources that come at significant environmental costs (Steinfeld et al, 2006: 20). It is only by taking appropriate action in how agriculture, forestry and fisheries

respond to the population and consumption growth drivers and adapt to change that many global challenges will be successfully met (FAO, 2015).

In addition, with higher disposable incomes and urbanization, people also move away from relatively monotonous diets of varying nutritional quality towards more varied diets that include more pre-processed food, meaning more foods of animal origin, more added sugars and fat and often more alcohol (Steinfeld et al, 2006: 10).

3.2.3. The Impact of Animal Agriculture on Climate Change and Air Pollution

The atmosphere is fundamentally necessary to sustain life on earth. It serves many purposes, including regulating temperature and carbon, nitrogen, oxygen cycles, as well as protecting us from injurious radiation. There is no need to say that these processes are extremely complex and fragile, and human activities are affecting these exact processes that are keeping all living things alive, in harmful ways. Some human activities have a larger negative impact and the animal agriculture sector plays one of the major parts.

At virtually each step of the livestock production process substances contributing to climate change or air pollution are emitted into the atmosphere. Such changes are either the direct effect of livestock rearing, or indirect contributions from other steps on the long road that ends with the marketed animal product (Steinfeld et al., 2006: 81). Billions of animals are raised for food each year which in turn causes some form of depletion or degradation of our air and soil (Oppenlander, 2012: 37).

The share of the animal agriculture to greenhouse gas emissions may increase in importance even more since energy and industrial emissions are slowly growing less rapidly than in the past, while some agricultural emissions continue to grow (FAO, 2015). There is increasing concern not just with the increase of carbon dioxide ($CCCC_2$) in the atmosphere, but also with the growth of agricultural emissions of other gases such as methane, nitrous oxide and ammonia arising from livestock and crop production (FAO, 2006a). Several studies have shown that human activities have resulted in our escalating present-day concentrations of carbon dioxide and methane, and that they are the highest that these greenhouse gases have been in the last 650.000 years (Siegenthaler, et al., 2005). Not only that, also methane concentrations have increased by about 150 percent since 1800 (Oppenlander, 2012: 39).

> *The animal agriculture sector is responsible for nearly 18 percent of greenhouse gas emissions. Global transportation on the other hand, accounts for 13 percent. Meaning that what we decide to eat everyday generates more global warming than all cars, planes, trains, boats, trucks, buses and so on combined. (Andersen & Kuhn, 2014)*

Animals raised for food emit large amounts of greenhouse gases in both direct and indirect ways. Indirectly, livestock adversely affect the carbon balance of the land used for feed crops and pasture, as well as with the massive amounts of fossil fuel used in the production process, including feed production, processing, mulitple levels of transport, and marketing of livestock products (Oppelander, 2012). Directly, all types of livestock emit carbon dioxide ($CCCC_2$) from the respiratory process. To compare, there are about 6.5 billion humans

on earth and there are approximately 60 billion more animals on earth than humans, all of which breathe in oxygen and breathe out carbon dioxide. Additionally, all livestock emit methane, nitrous oxide and ammonia and carbon as part of their digestive process in the form of flatulence, manure and urine (Steinfeld et al., 2006). In his book *Comfortably Unaware*, Richard Oppenlander states that: *'in the United States alone, livestock produce 89.000 pounds of excrement every second – that is 130 times as much as the entire human population of the country' (Oppelander, 2012).* As a whole, livestock emit 10 percent of all carbon dioxide ($CCCC_2$) and 40 percent of all methane ($CCCC_4$), which has 25 times the global warming potential (GWP) of $CCCC_2$, 65 percent of nitrous oxide (NN_2CC), which is 298 times the GWP of $CCCC_2$ and two-thirds of all ammonia emissions, which cause acid rain and the acidification of our ecosysems (Oppenlander, 2012). This makes the production process of meat and other animal-derived products one of the largest contributors to global climate change. Producing one calorie of animal protein requires more than 10 times as much fossil fuel input and produces more than 10 times as much $CCCC_2$ as does one calorie of plant protein (Oppelander, 2012).

To assess climate impacts of different food choices, EWG (Environmental Working Group) partnered with CleanMetrics, an environmental analysis and consulting firm, to conduct lifecycle assessments (LCAs) of 20 popular types of meat (including fish), dairy and vegetable proteins. The assessments provide the entire carbon footprint of each food item based on the greenhouse gas (GHG) emissions generated before and after the food leaves the farm, from the pesticides and fertilizer used to grow animal feed through the grazing, animal raising, processing, transportation, cooking and, finally, disposal of unused food. To effectively describe the LCA of these products, the analysis considered the following greenhouse gases and calculated their carbon dioxide equivalents based on each one's global warming potential (GWP) – meaning the effect relative to carbon dioxide over a 100-year time frame.

- Carbon dioxide ($CCCC_2$): GWP of 1
- Nitrous oxide (NN_2CC) GWP of 298
- Methane ($CCCC_4$): GWP of 25

The chart below (see Figure 9) shows the total lifecycle of greenhouse gas emissions for common protein foods and vegetables, ranging from lamb to lentils, expressed in kilograms (kg) of carbon dioxide equivalents ($CCCC_2$) per kg of consumed product. In their study they compared production emissions data for the main meat proteins to several mostly peer-reviewed or government-sponsored studies in the U.S. and Europe that assessed greenhouse gas emissions from animal production systems (EWG, 2011).

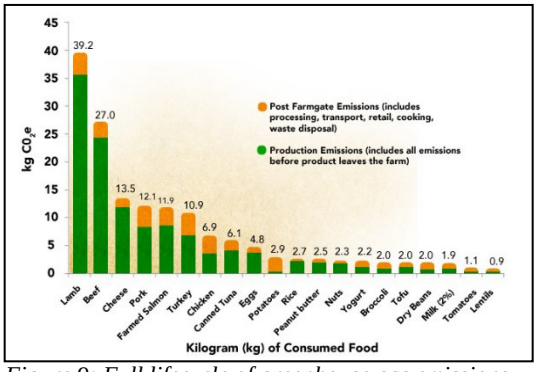


Figure 9: Full lifecycle of greenhouse gas emissions from common proteins and vegetables

Source: EWG, 2011

Another way to measure an individual's environmental impact is to look at the carbon footprint. Below you will find a graph (see Figure 10) showing how greenhouse gas emissions of twenty common foods compare to one another. The graph ranges from green to red, ranging from little impact to an incredibly high impact (EWG, 2011).

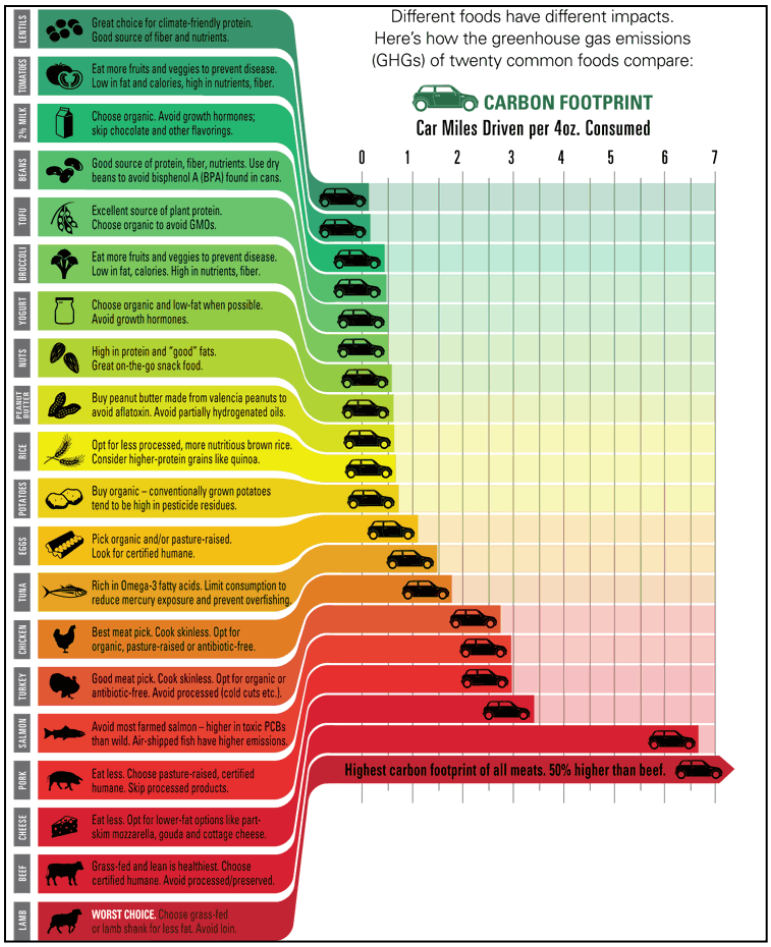


Figure 10: GHG data based on lifecycle assessment

Source: CleanMetrics, 2011

3.2.4. The Impact of Animal Agriculture on Land Resources

The way land is managed has a direct impact on the biophysical conditions of that strip of land including soil, water, fauna and flora. The animal agriculture sector has dramatically changed the use of land and this, in turn, has an environmental impact. With approximately 65 billion animals raised each year in the animal agriculture sector, enormous amounts of land are needed for their living space and grazing, and for growing crops for their feed. Livestock currently occupy 30 percent of all land mass on earth, and another 33 percent of all agricultural land is used to produce genetically modified organism (GMO) crops to feed these animals (Oppenlander, 2012).

There is an enormous amount of land and forests cleared for animal agriculture activities. This results in the destruction of vegetation, either through clearing forests and land for feed-crop growth or directly by the livestock themselves. When forests are cut down, the

oxygen flow cycle is disrupted, which results in an imbalance in the natural ecosystems with a significant impact on climate change and an increased threat for global warming. (Taylor, 2004). Massive deforestation brings with it many ugly consequences – those including, air pollution, soil erosion, the release of carbon dioxide into the atmosphere, the loss of biodiversity through extinction of plants and animals and, in a different context, the eviction and decimation of indigenous Indian tribes.

Fifty years ago, 15 percent of our planet was composed of rainforest; today, this has been reduced to less than 2 percent (Taylor, 2004). Approximately 1.5 acres of rainforest is cleared every minute of every day. That is essentially an entire football field every second (Andersen & Kuhn, 2014). On top of that it is estimated that every day, close to a hundred plant, animal and insect species are lost due to rainforest destruction. This number translates into about 34 million acres lost every year. Over 70 percent of the Amazon rainforest is already gone, and much more is severely threatened as the destruction continues. It is estimated that if nothing is done to curb this trend, the entire Amazon could well be gone within fifty years (Andersen & Kuhn, 2014).

The leading cause of this deforestation trend is the grazing of animals and the growing of feed-crops. The difference between both is that in the case of the use of land for crops, a portion of it is directly used to produce food for humans. Take soy for example: soy is used for veggie burgers, tofu, soy milk and so one but this is almost exclusively grown in the United States. 80 percent of the entire world's soy crop is produced and fed to animals that will eventually become the food for humans. As the demand in the Western world for meat increases, more and more rainforests are destroyed to provide grazing land for animals. Most of Central and Latin America's tropical and temperate rainforests have been lost to cattle operations to meet the world demand (Taylor, 2004) and this trend has not slowed down.

Rainforests are cleared, slashed and burned for the timber value and for farming and ranching operations to support the meat requirements around the world. Although local operators and businesses have some responsibility, much of the rainforest loss to support the animal agriculture sector is accomplished by world corporate giants. Regardless, the real blame for the depletion of our vital rainforest lies with the consumer who creates the enormous demand for animal products in the first place (Oppenlander, 2012).

3.2.5. The Impact of Animal Agriculture on Water Resources

> *Water represents at least 50 percent of most living organisms and plays a key role in the functioning of the planet's ecosystem. Additionally, it is a critical natural resource mobilized by most human activities. These resources are replenished through the natural water cycle; namely, the evaporation process mainly from the oceans. This evaporation process is the primary mechanism supporting the surface-to-atmosphere portion of the cycle (Xercavins, 1999 & Steinfeld et al., 2006: 125).*

In total, the oceans account for 96.5 percent, brackish water for about 1 percent and only 2.5 percent of all water resources are freshwater. On top of that, of those 2.5 percent of all freshwater resources, 70 percent are locked up in glaciers, permanent snow (e.g. polar caps)

and the atmosphere (UNESCO, 2005). Freshwater resources provide a wide range of goods such as drinking water, irrigation water, water for industrial purposes and services such as power for hydroelectricity generation, etc. Freshwater resources are the pillar to sustaining development and maintaining food security, livelihoods, industrial growth, and general environmental sustainability throughout the world (Steinfeld et al., 2006: 125 & Turner, et al., 2004). Since freshwater resources are so high on the list of basic necessities, it is very troubling that today, freshwater resources are becoming increasingly scarce.

The agricultural sector is the largest user of freshwater resources and therefore a key player in increasing water use and water depletion. The animal agriculture sector's use of water and contribution to water depletion trends are high and growing. An increasing amount of water is needed to meet growing water requirements in the livestock production process, from feed production to product supply (Steinfeld et al., 2006: 128). In the year 2000, agriculture accounted for 70 percent of water use and 93 percent of water depletion worldwide (see Table 1) (Turner, et al., 2004). Today people consume 30 to 300 liters per person a day for domestic use, while more than 3 000 liters a day are needed to grow their daily food (Turner, et al., 2004).

Sector	**Water use**	**Water depletion**
		(Percentages of total)
Agriculture	70	93
Domestic	10	3
Industrial	20	4

Table 1: Water use and depletion by sector

Source: Steinfeld et al., 2006: 126

Animal agriculture meets its water requirements through drinking water, the water contained in feedstuffs and metabolic water produced by oxidation of nutrients. Water is lost from the body through respiration (lungs), evaporation (skin), defecation (intestines) and urination (kidneys) (Steinfeld et al., 2006: 128). Apart from livestock's use of water for drinking, water is used for irrigating pastures and cropland for feed production. Considerable amounts of water are used in the processing of meat and milk in particular. Through the compacting effect of grazing and hoof action on the soil, livestock also have a determining, and often negative, impact on water infiltration and the speed of water movement across the landscape. Livestock play an important role in water quality through the release of nutrients, pathogens and other substances into waterways, mainly from intensive livestock operations. On top of that, land use and land management (especially the management of animal wastes) appear to be the main mechanism through which livestock contribute to the water depletion process (Steinfeld et al., 2006: 273). Through the use of water, the animal agriculture sector also has a polluting effect. Feed production, manure application on crops, and land occupation by extensive systems are among the main drivers for unsustainable nutrient, pesticide and sediment loads in water resources worldwide (Steinfeld et al., 2006: 167).

There is a luring threat of increasing scarcity especially when bearing in mind that global water withdrawal is projected to increase by 22 percent by the year 2025 with an expected

growth increase of 50 percent of the animal agriculture sector (Steinfeld et al., 2006: 126). Another major stressor is that these scarce freshwater resources are unequally distributed at a global level. More than 1 billion people do not have sufficient access to clean water (Steinfeld et al., 2006: 127). The need for water is of immense importance and the availability of water has always been and will probably always be a limiting factor to human activities, particularly in agricultural activities. The increasing demand for meat and other animal-derived products results in an increase in the level of demand for water which is a growing concern. As a direct consequence of the expected increase in the demand for water, Rosegrant, Cao and Cline (2002) projected that *'by 2025, 64 percent of the world's population will live in water-stressed areas; this compared to 38 percent today. Increasing water scarcity is likely to compromise food production, as water will have to be diverted from agricultural use to environmental, industrial and domestic purposes'* (Rosegrant, Cao & Cline, 2002)

3.2.6. The Impact of Animal Agriculture on Bio-Diversity

FAO's *Livestock's Long Shadow* refers to biodiversity as *'the variety of genes, species and ecosystems that can be found in the environment'* (Steinfeld et al., 2006: 181). For centuries, human beings have benefitted from the exploration of biodiversity, while at the same time often reducing it through the conversion of natural resource ecosystems for human uses. Agriculture, livestock fisheries and forestry have placed significant pressures on biodiversity while providing the basic building blocks for development and economic growth. The world's biodiversity is facing a crisis without precedence since the end of the last ice age, affecting all its three dimensions (genetic diversity, species diversity and ecosystem diversity). Genetic diversity is at risk, as wild population sizes shrink drastically and with them the gene pool. Species diversity is confronted with rates of extinction that far exceed the "background rate" found in the typical fossil record. Also the full range of ecosystems diversity is being threatened by its transformation through human activities (Steinfeld et al., 2006: 182).

According to an MEA Report (2005b & Steinfeld et al. 2006), the most important direct drivers of biodiversity loss and ecosystem service changes are:

- Habitat change (such as land use changes, physical modification of rivers or water withdrawal from rivers, loss of coral reefs, etc.).
- Climate change
- Invasive alien species
- Overexploitation
- Pollution

The animal agriculture sector plays an important role in the current biodiversity crisis, as they contribute directly or indirectly to all these drivers of biodiversity loss, at the local and global level. Typically, biodiversity loss is caused by a combination of various processes of environmental degradation (Steinfeld et al., 2006: 182). At many steps in the animal food production chain environmental impacts occur. Livestock-related land use and land-use change modify or destroy ecosystems that are the habitat for certain species. Livestock contribute to climate change, which in turn has a modifying impact on ecosystems and species. Terrestrial and aquatic ecosystems are affected by emissions into

the environment (nutrient and pathogen discharge in marine and freshwater ecosystems, ammonia emissions and acid rain). The sector also directly affects biodiversity through invasive alien species; meaning the livestock themselves and diseases for which they may be vectors as well as overexploitation, for example through overfishing and overgrazing of pasture plants (Steinfeld et al., 2006: 182).

The principal threats to ecosystems are presented below in Table 2.

Categories	Major ecosystems	Major threats
Marine and Coastal	Mangroves, coral reefs, sea grasses, algae, deep sea communities	Chemical pollution, overfishing, global climate change, alterations of physical habitat.
Inland water	Rivers, lakes, wetlands (e.g. swamps)	Physical alteration and destruction of habitat through water extraction, drainage, flood control systems, dams and reservoirs, sedimentation, pollution.
Forest	Tropical rainforests, sparse trees and parkland	Physical alteration and destruction of habitat, fragmentation, invasive alien species, unsustainable logging, extraction of non-timber forest products, fuelwood extraction, hunting, climate change, pollutants including acid rain.
Drylands	Mediterranean, grasslands, savannahs	Physical alteration and destruction of habitat, introduced herbivores (livestock), depletion of water resources, harvest of fuelwood, over-harvest of wild species, pollution, climate change.
Agricultural	Arable land (cropland), permanent pasture	Soil degradation, nutrient depletion, loss of genetic diversity, climate change, pollution (e.g. excessive use of fertilizer and GHG emissions), water depletion, loss of land.

Table 2: Major ecosystems and threats

Source: Steinfeld et al., 2006: 186

3.2.7. The Impact of Animal Agriculture on Human Health

In a report of the United Nations Food and Agriculture Organization it is stated that:

> *Access to safe and healthy food products is an important public good. Animal products, especially animal fat, are linked with human health risks, however, some of these risks are associated only with overconsumption. Growing densities of livestock, particularly in peri-urban and urban areas, import of feedstuffs from distant areas, and shifts in dietary habits have raised concerns about diseases, microbial contamination of food and general food safety. Changes in production systems, changing feeding practices and the safety of animal feed may increase the risk and change the pattern of disease transmission. The upsurge of human cysticercosis in eastern and southern Africa following the expansion in pork production is an example of how a zoonotic disease may become a significant risk when production systems change without accompanying changes in veterinary regulations and proper enforcement. (FAO, 2006a)*

3.2.8. Global Facts about Animal Agriculture

All food comes from somewhere and requires some degree of effort to produce, process and transport. However, with meat, dairy and fish products so many natural resources are affected that if we do not change this production process soon and adapt it within the boundaries of the earth's capabilities, the repercussions will become more intense and will lead to the irreversible destruction of natural ecosystems on which all living beings rely.

What has been discussed above shows that the livestock sector is a stressor on the planet as a whole. Globally, it is one of the largest sources of greenhouse gases and one of the leading causal factors in the loss of biodiversity as well as a major source of water pollution and land degradation. However, the animal agriculture sector is also a primary player in the agricultural economy which serves as a provider of livelihoods for the poor and a major determinant of human diet. Therefore, its environmental role needs to be seen in the context of many different functions, in many diverse natural and economic environments, subject to diverse policy objectives (Steinfeld et al., 2006: 267). There is a stark contrast between the rather modest economic contribution of the livestock sector and its important environmental and health dimensions (Steinfeld et al., 2006: 270). It is against this background that animal agriculture-environment interactions need to be seen and within this framework. Therfore, aspects such as land-use, water use and pollution, gaseous emissions, climate change and biodiversity need to be properly taken into account when designing policies to reduce the overall impact of the animal agriculture sector. Below you will find a table (see Table 3) depicting global facts about animal agriculture described in FAO's *Livestock's Long Shadow* report.

Dimension	Parameter	Value	Remarks
Economic Importance	Contribution to total GDP (2005)	1.4 %	
	Contribution to agricultural GDP (2005)	40 %	
	Growth rate (1995 to 2005)	2.2 % p.a.	
	Contribution to agricultural export earnings (2004)	17%	
Social Importance	Number of poor engaged in livestock activities	987 million	Full time or partially
	Total number of people engaged in livestock production	1 300 million or 20% of world population of 6.5 billion	Full time or partially
Food Security	Human edible protein supplied to livestock	77 million tons	
	Human edible protein supplied by livestock	58 million tons	
Health	Contribution to total dietary intake of energy	477 kcal per person/day or 17% of average daily intake	
	Contribution to total dietary intake of protein	25g per person/day or 33% of average daily intake	
	People suffering from under or malnourishment	864 million	Livestock products are a possible remedy
	Number of overweight persons	1 000 million	

	People suffering from obesity	300 million	Livestock products are one of the major causes
			Livestock products are one of the major causes
Land	Total land for grazing	3.433 million ha or 26% of terrestrial surface	
	Grazing land considered degraded	20 to 70%	
	Total land for feed crop cultivation	471 million ha or 33% of arable land	
Air and climate	Livestock's contribution to climate change in $CCCC_2$ equivalent	18%	Incl. pasture degradation and land use change
	Livestock's share in carbon dioxide emissions	9%	Not considering respiration
	Livestock's share in methane emissions	37%	
	Livestock's share in nitrous oxide emissions	65%	Including feed crops
Water	Share of livestock in total use of freshwater	8%	Drinking, servicing, processing and irrigation of feed crops
	Share of livestock in water evapotranspirated in agriculture	15%	Evapotranspiration for feed crop production only; other factors significant but not quantifiable

Table 3: Global facts about animal agriculture

Source: Steinfeld et al., 2006: 271

3.3. Climate Change and Policy Making

The threat of changes to the global climate has led to both national and international investigations into their potential as well as attempts by the international community to mitigate the causes or adapt to its potential effects. Uncertainties still surround the precise nature of the mechanisms of climate change which are associated with the enhanced greenhouse effect, i.e., the human contribution to natural changes of the climate system.

Global climate change raises the issue of the relationship between the general use of resources by human populations and the limits set to resources utilization (Sprinz & Luterbacher, 2001: 3). This requires the intervention of the international community to come up with solutions to this pressing problem. Therefore, on an international level, political mechanisms are being built to address the problem of global climate change. Since no country, by itself, would be able to substantially influence the climate system, international cooperation is sought to overcome this public goods problem (Sprinz & Luterbacher, 2001: 2).

3.3.1. Rationale for Government Intervention

Environmental goods are a sub-category of public goods and public policies are put in place to protect and enhance public goods. Environmental goods are typically non-market goods which provide many benefits to humans and other organisms. They provide a benefit now and will continue too for generations if not negatively affected. Environmental goods include: clean air, clean water, landscape, green transport infrastructure (footpaths, cycleways, greenways, etc.), public parks, urban parks, rivers, mountains, forests, beaches, etc. (Wikipedia, n.d.) Protecting those environmental goods can be a challenge since many goods are used by people who may not consider the environmental costs of using such a

good, resulting in costly protection efforts (Wikipedia, n.d.). Pollution is a major problem in this context, it damages environmental goods indefinitely, until, when possible, time and money is put forth to clean those goods (Steinfeld et al., 2006: 223).

According to FAO's *Livestock's Long Shadow*:

> *The rationale for public policy intervention is based on the concept of market failures. These arise because many local and global ecosystems are public goods, and the negative environmental impacts that animal agriculture has on those are externalities that arise because individual economic decisions usually consider only private individual costs and benefits. Information failures also exist, for instance the inadequate understanding of highly complex phenomena such as biodiversity or climate change. As a consequence of externalities and information failures, the market fails to deliver a socially desirable level of environmental impact. Besides market and information failures, there are also policy failures, such as, for example, subsidies that sometimes constitute perverse incentives, promoting inefficient resource use or activities that damage the environment (Steinfeld et al., 2006: 223).*

3.3.2. Obstacles to an Effective Animal Agriculture-Environment Policy

Animal agriculture-environment interactions are not always easily understood since many of the impacts are indirect, and therefore not obvious, which makes it a subject that is highly susceptible to underestimation. However you look at it, it appears two very essential things are missing. First, there is a lack of understanding about the nature and the extent of the animal agriculture sector's impact on the environment, among producers, consumers and policy-makers alike. Second, and partially as a result of the lack of understanding, a policy framework conducive to more environmentally benign practices simply does not exist in many cases, or is rudimentary at best. Often existing frameworks address multiple objectives and lack coherence. Worse still, existing policies often downplay animal agriculture's impact on the environment (Steinfeld et al., 2006: 222).

This neglect comes in different shapes and sizes. (a) Neglect may sometimes be conscious and deliberate. For example, in many poor and middle income countries, food supply and food security are given priority over environmental concerns. (b) Neglect of environmental impact may sometimes be motivated by a belief in the low chance of success of possible remedies. And in other cases (c) neglect may also stem from the strong lobbying influence that livestock producers wield in many countries (Leonard, 2006 & Steinfeld, et al., 2006: 222).

Whatever the motivation for the type of neglect, for the most part, the impact of the animal agriculture sector on the environment does not receive an appropriate policy response even though the means to do so exist (Steinfeld et al., 2006: 222). Despite the fact that steps toward a more sustainable future are being made, aided through the implementation of the SDGs, still very little is mentioned about the environmental impact of the production and distribution of animal products serving as our food.

This overall neglect is in stark contrast with the magnitude of the animal agriculture's impact on the environment and underlines the importance and urgency of developing appropriate institutional and policy frameworks. Such frameworks should consist of economy-wide and environmental policies, all the while taking into account the animal agriculture sector and its implications on the environment. (Steinfeld et al., 2006: 222). In other words, a separate sector policy for animal agriculture needs to be developed. In order to do that a series of guiding principles need to be taken into account in designing and implementing policies to address the animal agriculture impact on the environment. This is where Steinfeld et al. underline the following principle sources of mistaken or misguided policy actions: (a) market failures, (b) information failures and (c) failures due to differences in political influence (Steinfeld et al., 2006: 222 – 229).

3.3.2.1. Market Failures

With regard to animal agriculture and the environment, most market failures occur in the form of externalities. *'These are impacts borne by third parties as a consequence of decisions by individuals or organizations, and for which no compensation is paid or received. Both negative and positive externalities exist'* (Steinfeld et al., 2006: 223). In general, negative externalities arise when a producer or consumer imposes costs on others for which the imposer cannot be charged, and positive externalities occur when a producer or consumer creates benefits for others for which the provider cannot receive compensation (Pearson, n.d.). Scott Pearson provides an example of a negative externality in his work *Environmental Externalities in the Policy Analysis Matrix* by looking into the use of chemical pesticides in irrigated rice production:

> *Pesticides are applied to paddy rice in fields of standing water. The chemical residues remain in the water when it is drained from the paddy field. Others, located downstream, later use that water for drinking, irrigation, livestock production, or producing fish in ponds. Those downstream users of the polluted water suffer if the pesticide residues cause health problems. But these recipients of negative external effects have no way of charging the upstream rice famers for polluting the water. The market fails to include the negative external costs of pesticide residues in the upstream rice farmers' production costs. Consequently, there is a role for the government intervention to correct the negative externality. Reduced runoff and downstream sedimentation resulting from improved grazing management is an example of positive externality, through which a benefit is provided to society at large but for which usually no compensation is received (Pearson, n.d.).*

Externalities give rise to economic inefficiencies, in that the perpetrator has little incentive to minimize the negative externalities, or to maximize the positive, because the consequences are borne (or enjoyed) by the society, not the individual or company responsible (Pearson, n.d.). *'Therefore, it is necessary for these external costs (or benefits) to be "internalized", that is, to create a feed-back mechanism for external impact to be accounted for by the perpetrator (or providers) (Steinfeld et al., 2006: 223). The presence of environmental market failures creates unsustainable agricultural production systems' (Pearson, n.d.).*

The existence of an environmental market failure provides a rationale for government intervention to attempt to correct the divergence. In principle, a government should use a tax or subsidy policy to correct environmental externalities. *'The cost of the negative externality, such as the downstream effects of the pollution of water by chemical pesticides mentioned above, would be included in assessing the costs and benefits of the agricultural system. A tax on pesticide use would be imposed so that private marginal costs include the external costs and equal social marginal benefits'* (Pearson, n.d.). In practice, however, it is very difficult to apply this principle since many environmental goods and services are not traded, and, while they obviously are valued by society, they do not have a market price. In the absence of a market, valuing the environment in an appropriate way presents formidable challenges (Tietenberg, 2003, Pearson, n.d. & Steinfeld et al., 2006: 223). Governments, instead, have turned to a second-best policy; namely the use of quantitative standards, to limit the use of polluting inputs (Pearson, n.d.). These include cost-based methods which try to assess the damage, the abatement costs or the costs of substitution of an environmental good or service, as well as demand-based methods which attempt to estimate the willingness to pay or other expressions of preference for environmental goods or services (Steinfeld et al, 2006: 223).

3.3.2.2. Information Failures

While the animal agriculture sector undergoes rapid transformations, institutions have lagged in responding to the environmental challenges that have arisen and have failed in bringing information about environmental concerns to the public which results in people being unaware of the environmental impact of their food consumption patterns. Therefore there is a pressing need to bring this information on environmental concerns, and specifically awareness of the role of animal agriculture in the depletion of natural resources, to the attention of the general public, of consumers, of pupils and students and of policy-makers in private businesses and in public offices. Communication among all stakeholders is important because most environmental issues related to animal agriculture can only be successfully addressed in a concerted and negotiated way (Steinfeld et al, 2006: 237).

3.3.2.3. Policy Failures

Another kind of inefficiency arises from the failure of government intervention, referred to as policy failure. As opposed to a market failure, a policy failure *'represents a distortionary effect of active government intervention. Governments intervene in markets to achieve certain objectives' (Steinfeld et al, 2006: 223).* Government interventions may fail to correct market failures, or they may make existing distortions worse, or sometimes create new distortions of their own. *'Policy failures can arise from sectoral subsidies, inappropriate pricing, taxation policies, price controls,regulations and other policy measures.' (Steinfeld et al., 2006: 224)*

3.3.3. Policy Approaches

Through the Sustainable Development Goals, the United Nations identified the scale of challenges we face as a global community as those that range from the eradication of hunger and poverty, to reversing the impacts of anthropogenic climate change, to gender equality as well as quality education for all. All of these goals call for collective and collaborative action (UN, n.d.). Especially since it has become apparent that *'governments are no longer in a position to act independently from one another, nor in isolation from private actors. Power and decision-making in food systems ranges from producers, through retailers and traders, to corporate entities involved in funding research and public outreach programs.' (FAO, 2015)*

The FAO's SAFA principle's assessment of food and agriculture systems revealed that:

> *Policy-making in agriculture, forestry and fisheries is still largely based on national priorities. Yet, the challenges that the food sector faces are global, playing out in highly interconnected financial, energetic and natural resource-base environments. Therefore, there is a high urgency of a renewed analysis of how agriculture, forestry and fisheries depend on and impinge upon the sustainability of the world's ecosystems, populations and markets. Without this understanding, there is a high risk of business-as-usual policy-making and implementation having unintended leakage effects on priority sustainability outcomes, as well as continuing to fall short of delivering to global commitments, such as food security. The evolving structures of global production (multinational enterprises and global supply chains) pose increasing challenges for conventional regulation within single ministries, and often even by a single state, or at the international level by governments alone. To this day, there is still a need to understand how governmental interventions in different policy domains can link-up in such a way to build positive synergies and avoid wasted efforts and resources (FAO, 2015).*

Given the scale of the challenges ahead, new types of collaboration and partnership are necessary. Cooperation is required at all levels and especially among different sectors in order to ensure that agriculture, forestry and fisheries policies are planned and integrated within national development strategies and complimentary to trade, environment, climate and energy policies, to name but a few policy areas. More importantly, policies must reward sustainability and support continuous improvements (FAO, 2015).

3.4. Sustainable Development

Sustainable development has been defined by FAO as *'the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.'* (FAO, 1989).

3.4.1. Sustainability and Governance

What is defined ecosystems services in ecological terms, may be called public goods in economic terms. When referring to the outcomes or impacts of good or service, ecosystem services and public goods are often spoken about in nearly interchangeable terms (FAO, 2015). Market mechanisms alone have proven to be poor providers of goods which have a high degree of publicness; meaning where consumers cannot be excluded from consuming the good (e.g. climate or air) leading to the over-exploitation phenomenon. Furthermore, ecosystems are by their very nature the coming together of a variety of interconnected functions which cannot be separated or individually provided without causing (often unintended) effects. In economic terms, they have inherent "spillovers" or "externalities" (FAO, 2015).

For public goods with a high degree of publicness, society's present and future collective demands need to be enshrined in policies, targets and spending plans. Moreover, governments at both global and national levels should provide procedures to be followed when securing public goods, as well as the frameworks within which the private and voluntary sectors must operate to support and enhance governmental action. Governments have a unique potential in supporting the development of innovation and sustainable solutions, as well as rewarding sustainable food and agriculture systems (FAO, 2015).

3.4.2. Sustainability Policies

Implementing an effective climate policy is one of the main challenges for the future. Curbing greenhouse gas emissions and other negative environmental impacts can prevent future irreversible impacts of climate change. Climate policy is therefore crucial for present and future generations (Campagnolo, 2016).

3.4.2.1. International Climate Policy Developments

In 1997, the Kyoto Protocol committed most industrialized nations and some economies in transition to reduce overall emissions of greenhouse gases by 5.2 percent below 1990 levels between 2008 and 2012 (Carraro et al., 2010). However, the Kyoto Protocol did not reach enough international consensus to mitigate future climate change. A second effort was made in 2009 during the Copenhagen Climate Conference which launched a pledge-and-review process which ensured that major greenhouse gas emitting nations submitted an emission reduction plan (Carraro et al., 2010). However, it is the Climate Conference that took place in Paris in 2015 that is described to be the most historical. The adoption of the long-awaited Paris Agreement, which allows each country to determine mitigation action on a national level, officially proposed a bottom-up approach also for the post-2030 period (UNFCC, n.d.).

Another important milestone for 2015, closely intertwined with climate policy ambitions, is the adoption by UN General Assembly of the 2030 Agenda for Sustainable Development (UN, 2015) setting 17 Sustainable Development Goals (SDGs) to be achieved worldwide by 2030 by means of global strategy. The dimensions considered by the SDGs include poverty reduction, sustainable economic growth, environment preservation, and climate mitigation commitments as well. The two deals

signed in 2015 constitute a landmark calling to join efforts for the achievement of a sustainable future (Campagnolo et al, 2016).

3.4.2.1.1. Sustainable Development Goals (SDGs)

On January 1st 2016, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development officially came into force. The Sustainable Development Goals are a global commitment to end poverty, fight inequalities and injustice to tackle climate change, etc. It is an agenda to balance human prosperity while protecting the planet (UN, 2015).

The 17 Sustainable Development Goals and its 169 targets demonstrate the scale and ambition of this new universal Agenda. They seek to build on the Millennium Development Goals and complete what they did not achieve. They are integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental. The Goals and targets will stimulate action over the next 15 years in areas of critical importance for humanity and the planet (UN, 2015). While the SDGs are not legally binding, governments are expected to take ownership and establish national frameworks for the achievement of the 17 Goals. Countries have the primary responsibility for follow-up and review of the progress made in implementing the goals (UN, n.d.). Below you can find the list of the 17 SDGs (see Figure 11; UN, n.d.).

Figure 11: Sustainable Development Goals
Source: UN, n.d.

3.4.3. Food Choice and Sustainability

Sustainability means ensuring human rights and well-being without depleting or diminishing the capacity of the earth's ecosystems, or at the expense of the well-being of others. It is a multi-dimensional concept encompassing environmental integrity, social well-being, economic resilience and good governance: each of these sustainability dimensions involves several issues and all dimensions need to be considered in policy-

making activities (FAO, 2016a). The concept of being sustainable must project beyond self to include society and future societies, human and non-human life – both domesticated and wild life. On top of that, the thought of achieving sustainability must extend through many layers – economic, social, ethical – not just ecological – and ultimately be carried by our choice of foods (Oppenlander, 2013). Yet, sustainability efforts are rarely positioned to include food choice in an accurate manner. This is due to a number of influencing cultural, social, and political factors that disable our food production systems and limit our base of knowledge (Oppenlander, 2013).

The productive activities in agriculture, forestry and fisheries are fundamentally interconnected to the breadth of sustainability variables highlighted in the Sustainable Development Goals. Nowadays, the food and agriculture sector are increasingly representing a threat to the effective achievements of sustainability. Business-as-usual production practices are seriously undermining the viability of ecosystems and the life they sustain. Natural resources are as crucial for food and agriculture production, as much as food and agricultural practices determine the destruction or the sustainability of natural resources (FAO, 2015).

In the face of growing populations, uneven distribution of resources, and the effect of climate change already being felt, decision-makers face stark choices in the decades to come as they strive to meet the Sustainable Development Goals. In this era of unprecedented speed and scale of global flows (of finance, goods, services and people) and the globalization of challenges such as hunger, poverty, environmental degradation, disease and conflict; agriculture, forestry and fisheries can no longer be planned, implemented and assessed in isolation (FAO, 2015). Hence, it is essential for the leaders of a nation to make smart decisions when it comes to economic policies; especially while dealing with resource intensive economic sectors such as animal agriculture (Pandian, 2016). Therefore, international policy and cooperation ought not to be based only on market efficiency and competitiveness but include full costs of environmental damage, democratic decision-making processes and solidarity among nations (FAO, 2015). However, striking the right balance between the economic benefits and resulting trade-offs in the environmental realm is possible only through well-informed decisions which in turn are only possible if the effects of animal agriculture are well understood and correctly taken into account (Wu, 2014 & Pandian, 2016).

3.4.3.1. Trade-Offs

Agriculture plays a central role in sustainable development. Its fundamental position as the supplier of human nutrition shapes the global economy and society's relationship with the natural world. It is both an important driver of global climate change, as a result of land-use change and greenhouse gas emissions (Smith et al., 2014), and one of the sectors most vulnerable to its impacts (Vermeulen et al., 2012). With growing global population and affluence, the pressure on agricultural and natural systems increases. Despite these growing pressures, humans still expect agriculture to supply not only nutritious food but also employment, energy resources, clean water, biodiversity conservation and more. This situation makes it essential to navigate and manage the trade-offs between potential benefits and negative impacts that can arise as

food production interacts with other aspects of sustainable agricultural systems (Tilman and Clark, 2014). In framing public policies, governments and other stakeholders are confronted with important trade-offs (FAO, 2006b). For example, stricter food safety regulations to enhance public health constitute barriers that often prevent poor farmers from entering formal markets (FAO, 2006a).

Policies-making with regard to the animal agriculture sector need to address a range of social, economic, environmental and health objectives. Therefore, important trade-offs and compromises need to be made. In other words, it is essential to carefully assess the costs and benefits of the animal agriculture sector in order to be able to prioritize different objectives and design appropriate policy interventions (Steinfeld et al., 2006: 225). This is where the term "sustainability" comes into place. *'A production system is unsustainable if the farming practice imposes negative environmental externalities, creates environmental degradation, or results in both. This means that the costs of agricultural production in unsustainable systems are underrepresented because they ignore the immediate negative external impacts on others or the long-term degradation of the natural resources base.'* (Pearson, n.d.) Steps towards a more sustainable future (by also mitigating the negative externalities) have already been made through the implementation of the Sustainable Development Goals (which have been discussed above).

3.4.3.1.1. The Agriculture Sector in the Age of Sustainable Development

The analysis of trade-offs has become more and more. There can be multiple alternative pathways to sustainable agricultural systems whose suitability and outcomes vary depending on agro-ecological zone, farming system, cultural preferences, institutions and policies, among other factors. Each of these pathways results in a different degree of environment and socioeconomic trade-offs and synergies that must be recognized and addressed. With the international community now focused on how to implement the SDGs across local, national and global scales, it is more important than ever to understand how trade-off analysis can help decision-makers develop balanced approaches that take the links between the SDGs into account (Le Blanc, 2015). This integrated approach is particularly relevant for agriculture, as efforts to make this sector more economically, environmentally and socially sustainable are critical to the success of a majority of the SDGs (Canavan et al., 2016; Kanter, 2016).

While globally governments have come together along with scientists and other researchers in an effort to commence a more concentrated approach to reduce our impact on climate change through treaties like the Paris Agreement and through the implementation of the Sustainable Development Goals, it is clear that, even though there are a few environmental mitigation efforts in the framework of the Sustainable Development Goals, a list of the negative impacts of the animal agriculture sector on the sustainability of our planet is still missing. To this day, there is still little to no mention of the fact that a reduction in the production process of meat and other animal-derived products can also have an impact on curbing the negative impacts of climate change. It is extremely difficult for people to develop a better

understanding of a particular topic when there is confusion and mismanagement of information. So instead, governments around the world, should also aim their focus toward informing people on the impact of their food choices and the issues related to the production methods of the animal agriculture sector.

3.4.3.2. "Cowspiracy"

Whenever the causes of climate change are discussed, fossil fuels top the list. Oil, natural gas and especially coal are indeed major sources of human-caused emissions of carbon dioxide ($CCCC_2$). However, what has been occasionally downplayed as a significant source of GHGs is the lifecycle and supply chain of animals raised for food; i.e. the animal agriculture sector (WorldWatch, 2009).

Across the planet there are approximately 65 billion animals raised and killed for food every year and, at the moment, there are approximately 6 billion humans on the earth. For everyone looking at these numbers, it has to seem disproportionate. Andersen and Kuhn (2014) estimate that 18 percent of annual worldwide GHG emissions are attributable to the animal agriculture sector. Looking at it differently this means that animal agriculture is responsible for producing more greenhouse gas emissions than all transportation combined – cars, trucks, ships, trains and planes (Andersen & Kuhn, 2014). Additionally, the natural resources used to produce even minimal amounts of animal products are staggering – 1 hamburger = approximately 2500 liters of water = equivalent to showering for 2 months (Andersen & Kuhn, 2014). Add to this the massive clear-cutting and other destruction of forests – especially in the Amazon, as well as land devoted exclusively to raising livestock representing 45 percent of the earth's ice-free mass, not including the assaults on the ocean, where three-quarters of the world's primary fisheries have been overexploited and vast parts of the seas are in danger of becoming dead zones (Andersen & Kuhn, 2014 & WorldWatch, 2009). All of these numbers should easily qualify for a hard look in the search for ways to address climate change. Yet, no proper attention is paid to the environmental effects of the animal agriculture sector. And given what lies ahead as global warming ravages the ecosystem, the failure to curb the destruction wrought by the animal agriculture sector is a serious oversight.

So why is it that it is not being properly addressed? Why does a reduction in the meat production process not get a spot on the list of possible mitigation efforts? We choose fewer disposables, more gas-efficient cars, energy saving appliances and light bulbs. We reduce, re-use and recycle properly. Despite all the information provided on what to do on an individual level to reduce one's ecological footprint, reducing the overall consumption of animal-related products is also an important environmental decision a consumer can make. Since a reduction in demand could lead to a reduction in production. However, it seems as though the major environmental organizations, the media, schools and politicians are often keeping this vital piece of information from the public.

In 2014, Kip Andersen and Keegan Kuhn introduced an environmental documentary called *Cowspiracy: The Sustainability Secret* (2014) which states that the environmental impact of the animal agriculture sector is kept from the public in order to protect the massive corporate profits flowing into the animal agriculture industry and that we are kept blind by design. The documentary reveals the animal agriculture sector as one of the most destructive industries and investigates why the world's leading environmental organizations are too afraid to talk about the environmental impact of the animal agriculture sector. According to Anderson the truth and a rational response to this global crisis has been sacrificed for greed.

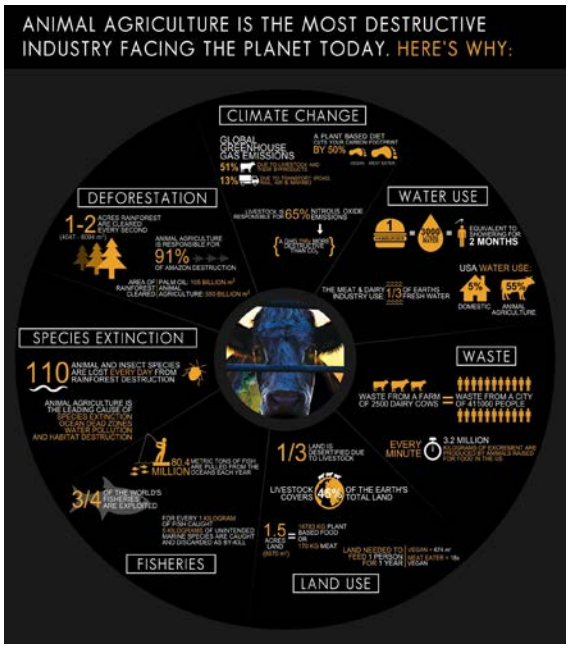


Figure 12: Cowspiracy: Facts
Source: Andersen & Kuhn, 2014

The documentary describes the animal agriculture sector as the primary driver of deforestation, water consumption and pollution, rainforest destruction, species extinction, habitat loss, soil erosion, climate change and other environmental ills. As Andersen approaches leaders in the environmental movement, he increasingly uncovers what appears to be an intentional refusal to discuss the issue of animal agriculture. The refusal by major environmental organizations to confront the animal agriculture sector is regarded as evidence on how the activist community has surrendered to corporate power. (Andersen & Kuhn, 2014).

Cowspiracy states that politicians, often bought off by agro-business money, will not advocate for a flexitarian, vegetarian or vegan diet which can have an impact on curbing global warming. Also the media, which depends on advertising dollars from the animal agriculture industry, is not going to tell the truth about what this industry is doing to the planet. This is also demonstrated by the implementation of ag-gag laws that make it a crime to speak, or show the truth about animal agriculture (Andersen & Kuhn, 2014 & Humane Society, n.d.).

After seeing the documentary, I decided to do some research of my own. To this end, I designed a survey with a set of questions in order to determine to what extent people are aware of the environmental impact of the animal agriculture sector and whether or not they believed they are being properly informed about the environmental impacts of their food consumption choices. The next chapter will outline the survey research.

4. Survey Research

This chapter describes the methodology used and intends to cover the step-by-step list of activities followed in the creation, as well as the distribution of the survey. It also describes the tools that were used for this survey and the reasons behind choosing these tools for the corresponding actions.

A descriptive, survey research design (Annex A) was chosen. The purpose of this research is to determine to what extent people are aware of the issues surrounding climate change in general as well as those issues related to animal agriculture. It aims, therefore, at finding out whether or not people believe their food consumption habits (mainly animal products) can also affect the environment. First, the research design section will define the type of research, the sample size, the instrument, and the procedures used for the research. Second, the data analysis plan will describe the data analysis process of the research.

4.1. Research Design

A descriptive, survey research was chosen as a data collection tool to gather information about individuals. In this thesis a survey was utilized in order to investigate the characteristics, behaviors and opinions of a group of people on to the subject of climate change and animal agriculture. The survey's aim is to obtain the opinions of the respondents on issues related to climate change in general and whether or not they think animal agriculture could also be considered a factor influencing environmental degradation. More specifically it addressed the following research question: *What is the environmental impact of animal agriculture?*

4.1.1. Purpose

Before actually writing the survey I decided on why I would be sending it out at all. Firstly, I tried to determine what point I was trying to prove and what questions I needed answered. This because I knew it would influence the questions and question types I needed to ask in the survey. The main goal is an obvious one, I want to know what people think about animal agriculture. The first thing that needed to be figured out is: why do I want to know what people think about animal agriculture? Is it because I am a meat or dairy farmer who wants to know how many new cows to buy this year? Or is it because I am an environmentalist gauging the demand for animal products and trying to determine its environmental impact? Or is it because I am an animal activist and want to market a plant-based diet most effectively? I am none of the above, I am a student writing her thesis on a subject I feel very strongly about. The intent of this thesis is to provide an informational base upon which readers can be afforded the opportunity to increase their awareness of food choice as it affects the sustainability of the environment.

4.1.2. Demographic

In order to pick the best way to design and distribute the survey, I decided on who my target demographic would be. Since the subject of the survey is of global importance, I made sure to write a single survey that works for different groups of people, followed by using unique survey links sent to different demographics through various channels (like Facebook, email and in some cases (very few) on paper).

4.1.3. Sample Size

Once I had decided who to ask, I had to make sure I had enough respondents. Figuring out the number of people you need to have respond to your survey (known as sample size) will make sure that the analysis of the data you collected are a strong basis for good decisions. Since the subject dealt with in this thesis has a global dimension and is of concern to every single person on the planet, I opted to use the so-called random sample, where respondents are chosen entirely by chance from the population at large. The main benefit of the random sample approach is that each member of the population has an equal chance of being selected to participate in the research. This means that it guarantees that the sample chosen is representative of the population and that the sample is selected in an unbiased way. (ThoughtCo, 2017). However, the software I used to develop the survey, www.survio.com, is a software for online surveys and since I had a free account it meant that I could only get up to a 100 respondents.

4.1.4. Procedure

For the purpose of my thesis I decided to create a survey in order to determine to what extent people are aware of issues related to climate change and global warming in general as well as issues related to animal agriculture. After having assembled the survey questions, I had to decide on the type of collector I was going to use. A collector, which is a way of describing the way to collect survey responses, can be any method to get responses. I have chosen to send the survey via an email invitation describing the study and its importance, and by posting it on my wall on Facebook, as well as in different Facebook Groups those being: *Master Internationale Betrekkingen en Diplomatie*, *Toegepaste Taalkunde UA*, *Vegan Antwerp*, *Vegans of Belgium*, *Erasmus ESN Antwerp 2016-2017* and *Erasmus Student Network Antwerp*.

I used www.survio.com to design the questionnaire for this survey research study. This particular survey website was chosen for several reasons:

- It was suggested by someone who had previously used it;
- The use of the software was of no cost to the researcher;
- This software generated graphs based on the answers of the respondents;
- Once I had designed the survey using the software, I received a link from the survey page which I could then use when asking people to take part in the survey;
- The software provided by www.survio.com also allowed me to track responses which enabled me to follow how many people had responded to the survey and what their answers to the questions were;
- www.survio.com also has a build-in function which ensures that people are unable to fill out the survey twice which helped me in the response validation.

Students had access to the survey for four weeks before it was closed and all of the data were transferred to an Excel file and graphs were generated by the survey software. I sent follow-up emails to thank those who had already participated in the survey and to politely encourage others to participate.

4.2. Data Analysis Plan

Because I wanted to gain a more insightful understanding of what the data meant, I attributed my specific survey questions to a general question. So when it comes to writing a final conclusion, I'll know exactly which data I need to answer my bigger questions.

Research Question	*Survey Question(s)*
How can the diet of the respondents be categorized and what is their reason for choosing it?	7. How would you characterize your eating habits (diet)? 8. What is the reason for choosing your diet?
How well do the respondents know the policies put in place to deal with climate change?	9. Have you heard of the United Nations Framework Convention on Climate Change (UNFCCC) and/or the Conference of Parties (COP)? 10. Have you heard of the Kyoto Protocol? 11. Have you heard of the 17 Sustainable Development Goals (SDGs), also called Agenda 2030?
How concerned are the respondents with environmental degradation?	12. How concerned are you about the impact of greenhouse gas emissions on the environment? 13. How concerned are you about air pollution?
How well are people informed on global environmental issues?	14. How well do you feel that you understand global environmental issues? 16. Do you think that the global temperature has risen, stayed the same, or fallen since 1800? 17. Do you think that the evidence on global warming is widely accepted by the scientific community, or do a significant number of scientists have serious doubts? 18. Do you think that the condition of the environment will be better, worse, or about the same for the next generation if no changes take place? 19. Do you think that human activity is contributing to any increase in global temperatures? (= anthropogenic climate change)

20. How well do you think the environment can recover on its own from problems caused by human activities if no changes take place?

22. From what you have heard and read in the news, do you think that the seriousness of global climate change has been generally exaggerated, generally correct, or is it generally underestimated?

How do the respondents personally feel about certain issues related to climate change?

15. According to your understanding, rank the following five global climate change issues in terms of impact on the global environment. (1 is highest impact, 5 is lowest impact)

21. Do you feel that all people around the globe are equally responsible for the global climate repair, or should wealthy countries bear more of the responsibility?

23. Since the environment and the global economy are linked, which of the following statements do you agree with more? The environment must be protected, even at the risk of curbing economic growth. OR, Economic growth must be protected, even if the environment suffers to some extent.

24. How much do you think government regulations designed to reduce global warming will help to curb the warming?

25. Do you think that global climate change can be reduced without individuals making major lifestyle changes, or only if individuals make major lifestyle changes?

26. There is a proposed system called “cap and trade” designed to provide incentive for companies to reduce emissions. Governments would set limits on greenhouse gas emissions and issue permits limiting each company’s allowed emissions. Companies exceeding emissions would have to purchase permits from companies that did not use all of their permits. Would you favor or oppose this system?

	27. Should the United Nations be responsible for generating a binding international agreement to regulate greenhouse gas emissions?
How well are the respondents aware of the fact that food consumption habits also have an environmental impact?	28. Do you think the food you eat has an environmental impact? 29. Do you think a plant-based diet is healthier than a meat-based diet? 30. Do you think a plant-based diet is more environmentally friendly than a meat-based diet?
How well are the respondents aware of the fact that animal agriculture has an environmental impact?	33. Do you agree with the following statement: "There are ample ways an individual can fight global warming. Using less energy, taking public transport, installing energy-efficient appliances, using alternative fuels, … all of these things can help. But, surprisingly, choosing not to eat beef and milk can also have an enormous impact in helping to fight climate change."
How willing are the respondents to change their own behavior in order to limit their impact on the environment?	31. How likely are you to buy a more expensive product if its packaging is more environmentally-friendly than its competitor's product? 32. How willing are you to change your lifestyle to reduce the damage you cause to the environment? 35. Would you be willing to take part in actions such as "40 days without meat"? 36. What are you doing to limit your impact on the environment?
How well do the respondents feel that the government and the media are informing them on the environmental impact of animal agriculture, more specifically the environmental impact of their food consumption habits of animal products?	34. Do you feel that the government and the media is providing enough information on the impact of your food choices (mainly animal products) on the environment?
What are the consumption patterns of the respondents in the past month?	37. How often, in the past month, did you eat the following?

How well do the respondents really know environmental affairs?	38. Below are a number of statements. Please read each one and indicate to what extent you agree or disagree with each statement.

Another important aspect is the understanding of the significance of data – and figuring out to what extent people are aware of the environmental impact of animal agriculture – by identifying different demographic groupings through segmenting the respondents. Therefore, in order to get a handle on who is taking the survey, I included a number of demographic questions. Filtering the results by different demographic groups helps gain a better perspective.

Demographic Question	*Survey Question(s)*
Who are the respondents?	1. Which of the following best describes your age group? 2. What is your current status? 3. What is your gender? 4. What is your highest degree earned? 5. In which income group do you belong if you count your monthly net income? 6. What is your religion?

5. Results and Analysis

This chapter intends to assess the results obtained from the descriptive survey research in order to aid in providing a clearer answer on the research question.

5.1. Data Screening

The purpose of this research is to determine to what extent people are aware of the issues surrounding climate change in general as well as those issues related to animal agriculture. In order to do that people were asked to fill out a survey questionnaire containing 38 question on the subject of climate change and animal agriculture. Different sets of survey questions provided an answer to sub-questions to the general research question.

- Based on the following questions I was able to determine who the respondents were (= demographic related questions).
  Q1, Q2, Q3, Q4, Q5 and Q6
- Based on the following questions I was able to find out the respondents' diet and their reason for choosing it.
  Q7 and Q8
- Based on the following questions I was able to find out if people are familiar with policies put in place trying to reduce our impact on global warming/climate change.
  Q9, Q10 and Q11
- Based on the following questions I was able to find out how concerned people are about environmental degradation.
  Q12, Q13 and Q15

- Based on the following questions I was able to find out how well people are informed about climate change issues.
  Q14, Q16, Q17, Q18, Q19, Q20 and Q22
- Based on the following questions I was able to find out the personal opinions of people related to climate change.
  Q15, Q21, Q23, Q24, Q25, Q26 and Q27
- Based on the following questions I was able to find out whether or not people are aware of the environmental impact of animal agriculture.
  Q28, Q29, Q30 and Q33
- Based on the following question I was able to find out whether or not people believe the impact of animal agriculture is properly addressed by governments and the media
  Q34
- Based on the following questions I was able to find out to what extent people are willing to change their behavior to limit their individual impact on the environment.
  Q31, Q32, Q35 and Q36
- Based on the following question I was able to look at the consumption pattern of the respondents in the past month.
  Q37
- Based on the following question, which contained 10 statements that were all true, and by asking to what extent people agreed with those statements, I was able to find out how well people know environmental affairs.
  Q38

5.2. Data Analysis

Figure 13: Graph on demographics

Source: www.survio.com

Demographics

The data represents 100 respondents. The questions in the study are categorized by the following demographics: 71% female, 29% male and with 63% between the ages of 18 and 24, 23% between the ages of 25 and 34, 3% between the ages of 35 and 44, 5% between the ages of 45 and 54, 3% between the ages of 55 and 65 and 3% between the ages of 65 and 74.

Of these 100 respondents 64% are students, 30% are employed, 3% are self-employed and 3% are retired with 33% having a high school degree, 42% with a bachelor's degree, 24% with a master's degree and 1% with a doctoral degree.

When looking at the net income 46% have a student income, 13% have no income, 2% have a net income of up to €500, 10% between €1000 and €1500, 13% between €1500 and €2000, 5% between €2000 and €2500, 3% between €2500 and €3000, 4% with a net income of €300 or more and 3% that were not comfortable to answer the question.

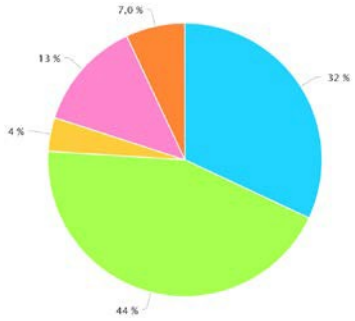
In terms of religion 16% associated themselves with Agnosticism, 42% with Atheism, 3% with Buddhism, 31% with Christianity, 1% with Islam, 4% with Spiritualism, 1% identified him or herself with Realism and 2% didn't specify.

The survey itself consisted of 38 questions and of those 38 questions, 7 are analyzed below. I selected questions Q7, Q19, Q22, Q28, Q33, Q34 and Q25 because I felt they were the most

important ones in the context of this thesis and therefore, the ones that could best help me in providing a clearer answer to the research question.

Type of diet

The first important distinction is perhaps the characterization of the type of diet. People are social beings that are greatly influenced by what people think. No matter how individualistic society may have become, communities and traditions continue to push the identity formation and ideology of individuals (Joy, 2010). As already mentioned, vegetarianism and veganism remain an issue of debate (Pandian, 2016). People who identify themselves with those types of diet can be regarded as people who go against a particular trend; this being the consumption of meat and other animal-derived products (Gormon, n.d.). It is thus clear that how one considers oneself will affect the answers to the questions; meaning that the type of diet the respondents identify with will influence their answers. Below you will find a graph and the corresponding answers to question 7: *How would you characterize your eating habits (diet)?*



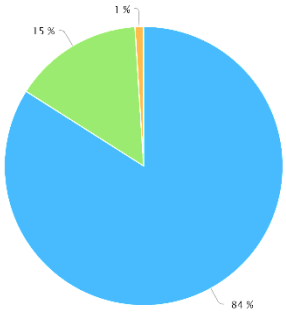
	Antwoord	Antwoorden	Ratio
●	Carnivorous (meat-based diet)	32	32 %
●	Flexitarian (occasional consumption of meat)	44	44 %
●	Pescetarian (a diet that includes fish or other seafood, but no other types of meat)	4	4 %
●	Vegetarian (a diet that excludes meat and fish or other seafood)	13	13 %
●	Vegan (abstaining from the use of animal products in their diet and this philosophy is usually extended into other areas of their lives (cosmetics, clothes, household items, etc.)	7	7,0 %

Figure 14: Graph and data on the type of diet

Source: www.survio.com

Anthropogenic climate change

Among climate scientists it is generally accepted that the average temperature on earth has increased during the last decades of the 20th century. In addition, a large majority believes that this trend is mainly caused by an increase in the concentration of greenhouse gases in the atmosphere, as a consequence of human activities such as the burning of fossil fuels, deforestation and certain industrial and agricultural activities; amongst those being animal agriculture. However, some scientists believe that natural variation is a major reason for the rise in temperature rather than human activities. By now, a majority of the public as well as politicians have accepted that there is a climate problem and that this has also been influenced by human activity. What remains ambiguous is the extent of this human-caused influence. Therefore, the next question aims at finding out people's opinions on anthropogenic climate change. Below you will find a graph and the corresponding answers to question 19: *Do you think that human activity is contributing to any increase in global temperatures? (= anthropogenic climate change)*



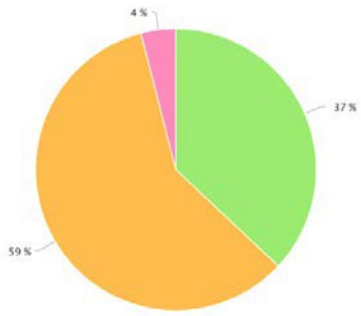
	Antwoord	Antwoorden	Ratio
●	Significantly contributed by humans	84	84 %
●	Moderately contributed by humans	15	15 %
●	Not at all – Natural causes can explain any increase in global mean temperatures	1	1 %

Figure 15: Graph and data on anthropogenic climate change

Source: www.survio.com

The seriousness of global climate change

The controversy surrounding global warming and climate change remains an issue of widespread political debate (Dryzek et al., 2011). It refers to a variety of disputes, significantly more pronounced in the popular media than in scientific literature, regarding the nature, causes and effects of global warming (Dryzek et al., 2011). The contested issues include the causes of the increased global average air temperature, whether this warming trend is unprecedented or within the normal climatic fluctuations, whether humanity has contributed significantly and whether the rise is wholly or partly a result of bad measurements. Other disputes concern estimates of climate sensitivity, forecasts of additional warming, and what the effects of global warming will be (Dryzek et al., 2011). The debate has a political dimension because proven influence by major stakeholders has raised the question whether the environmental implications of animal agriculture have been downplayed (Andersen & Kuhn, 2014). Many of the issues that are settled within the scientific community, such as a partial human responsibility for global warming, remain the subject of politically and/or economically motivated attempts to downplay, dismiss or deny them—an ideological phenomenon categorized by academics and scientists as climate change denial (Dryzek et al., 2011). The sources of funding for those involved with climate science—both supporting and opposing mainstream scientific positions—have, therefore, been questioned by both sides. The fossil fuels lobby has been identified as covertly (and on occasions overtly) supporting efforts to undermine or discredit the scientific consensus on global warming by pressuring climate scientists to censor or suppress their work and hide scientific data (Vidal, 2011 & Dryzek et al., 2011). Therefore, I wanted to look into the opinions of the people regarding the seriousness of global climate change. Below you will find a graph and the corresponding answers to question 22: *From what you have heard and read in the news, do you think that the seriousness of global climate change has been generally exaggerated, generally correct, or is it generally underestimated?*



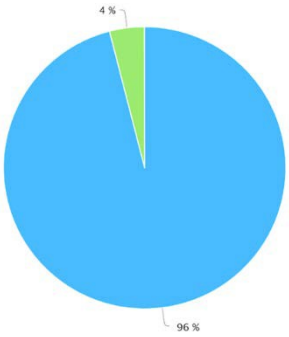
	Antwoord	Antwoorden	Ratio
●	Exaggerated	0	0 %
●	Correct	37	37 %
●	Underestimated	59	59 %
●	Unsure	4	4 %

Figure 16: Graph and data on the seriousness of global climate change

Source: www.survio.com

Environmental impact of food

Now that the world population is growing rapidly to 9 billion people, by 2050, it is projected that the industry must produce at least 50 percent more food than today (FAO, 2015). Especially in cities where by that time 70 percent of the world's population will live, a constant supply of food is necessary (FAO, 2006a). It is becoming increasingly important to establish how food production affects the environment and the climate as well as to figure out what is needed to feed a growing world population with the smallest possible ecological footprint (Global Footprint Network, n.d.). Therefore, alternatives to scarce natural resources are needed like production methods to reduce ecological footprint and innovations that end the huge waste in the entire supply chain (Steinfeld et al., 2006). To this end, I wanted to find out if people were in fact convinced about the environmental impact of their food choices. Below you will find a graph and the corresponding answers to question 28: *Do you think the food you eat has an environmental impact?*



Antwoord	Antwoorden	Ratio
Yes	96	96 %
No	4	4 %

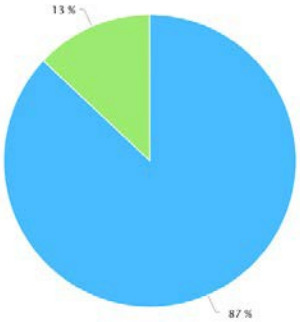
Figure 17: Graph and data on the environmental impact of food

Source: www.survio.com

Environmental impact of meat and other animal-derived products

The main focal point of this thesis is animal agriculture. The graph above shows the opinions on the environmental impact of food in general, whereas the next graph is basically a more detailed look into the previous one by looking into the environmental impact of meat and other animal-derived products. It is less known that our daily consumption of meat also has a significant impact on the environment (Oppenlander, 2012) and in order to protect the oceans, forests and the climate in general, we need to critically look at what we eat and how we produce the food we consume (FAO, 2015). For when cultivating agricultural crops and keeping animals, carbon dioxide, methane and nitrous oxide are released into the atmosphere. These greenhouse gases contribute to global warming with meat and dairy are being the biggest offenders (Steinfeld et al., 2006). The digestion of cows and other ruminants creates methane, a powerful greenhouse gas. In addition, the animal agriculture sector is responsible for the use of a huge amount of feed for the animals, which further increases the carbon footprint of animal products. Add to this the other harmful effects, for example, the mountains of manure the animal agriculture sector must seek to get rid of. The manure pollutes the air, the water and the soil, which causes plant and animal species to go extinct. But also the cultivation of crops involves a lot of pollution. Just think of all insecticides, and fertilizers that are used (Steinfeld et al., 2006). Therefore, I wanted to find out if people are aware that the production process of meat and other animal-derived products has an environmental impact. Below you will find a graph and the corresponding answers to question 33: *Do you agree with the following*

statement: "There are ample ways an individual can fight global warming. Using less energy, taking public transport, installing energy-efficient appliances, using alternative fuels, … all of these things can help. But, surprisingly, choosing not to eat beef and milk can also have an enormous impact in helping to fight climate change."



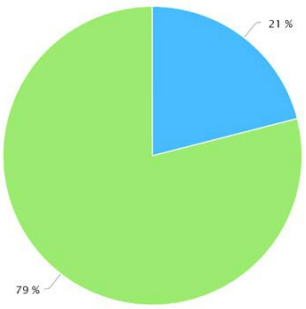
Antwoord	Antwoorden	Ratio
Yes	87	87 %
No	13	13 %

Figure 18: Graph and data on the environmental impact of meat and other animal-derived products

Source: www.survio.com

Government and media information

Animal agriculture is responsible for 18 percent of greenhouse gas emissions, which is more than the exhaust from all transportation combined (Andersen & Kuhn, 2014). This as well as all the other harmful effects such as land degradation, deforestation, loss of biodiversity, global warming, etc. should easily qualify for a hard look in the search for ways to address climate change (Steinfeld et al., 2006). By publicly addressing that a reduction in the production as well as the consumption of meat and other animal-derived products is an essential part of a climate change strategy, it is argued that progress in curbing climate change would go a lot quicker (Andersen & Kuhn, 2014). However, meat was not on the menu of the historical *Paris Climate Change Conference* in 2015. No proper attention is paid to the environmental effects of animal agriculture. And given what lies ahead as global warming ravages the ecosystem, the failure to curb the destruction wrought by the animal agriculture sector, especially since so many problems have risen because of climate change such as draught, are a serious oversight. Without the intervention of the international community to come up with solutions to this pressing problem, it is unlikely that a lot of progress in curbing climate change can be made. In this era of unprecedented speed and scale of global flows (of finance, goods, services and people) and the globalization of challenges such as hunger, poverty, environmental degradation, disease and conflict; agriculture, forestry and fisheries can no longer be planned, implemented and assessed in isolation (FAO, 2015). Therefore, it is important that in policy-making the environmental impacts of the animal agriculture sector are properly taken into account (FAO, 2016a). However, to this day it remains a sensitive issue since it has been stated that governments are put under pressure by the agriculture industry itself to downplay the extent of its impact (Dryzek, et al., 2011). The next question, therefore, aimed at finding out whether or not people felt they are being properly informed on all aspects surrounding global warming. Below you will find a graph and the corresponding answers to question 34: *Do you feel that the government and the media is providing enough information on the impact of your food choices (mainly animal products) on the environment?*

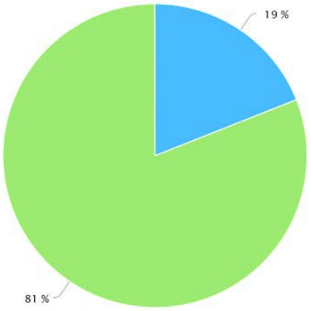


Antwoord	Antwoorden	Ratio
Yes, I believe we are properly informed on the impact of our food choices on the environment	21	21 %
No, I do not believe we are properly informed on the impact of our food choices on the environment	79	79 %

Figure 19: Graph and data on government and media information
Source: www.survio.com

The possibilities provided by lifestyle changes

Everyone uses a portion of the earth's surface. How much space depends on one's consumption patterns. The Global Footprint Network came up with a metric system that measures how much nature we have and how much nature we use called *The Ecological Footprint*. It measures how fast we consume resources and generate waste compared to how fast nature can absorb our waste and generate new resources (Global Footprint Network, n.d.). Under a business-as-usual scenario, human demand on the earth's ecosystems is projected to exceed what nature can regenerate by about 75 percent by 2020 (Global Footprint Network, n.d.). Therefore, it is important to make ecological limits central to our decision-making process while using human ingenuity to find new ways to live well within the boundaries of the earth. This requires an investment in technology and infrastructure that will ensure production processes in a resource-constrained world. It means taking individual action, and creating the public demand for businesses and policy makers to participate. To this end, I wanted to find out if people do in fact believe that individual lifestyle changes are required in curbing climate change. Below you will find a graph and the corresponding answers to question 25: *Do you think that global climate change can be reduced without individuals making major lifestyle changes, or only if individuals make major lifestyle changes?*



Antwoord	Antwoorden	Ratio
Without major changes	19	19 %
Only with major changes	81	81 %

Figure 20: Graph and data on the possibilities provided by lifestyle changes
Source: www.survio.com

5.3. Conclusion

Animal agriculture-environment interactions are not always easily understood since many of the impacts are indirect, and therefore not obvious, which makes it a subject that is highly susceptible to underestimation. However you look at it, it appears two very essential things are missing. First, there is a lack of understanding about the nature and the extent of the animal agriculture sector's impact on the environment, among producers, consumers and policy-makers alike. Second, and partially as a result of the lack of understanding, a policy framework conducive to more environmentally benign practices simply does not exist in many cases, or

is rudimentary at best. (Steinfeld et al., 2006: 222). Therefore, besides trying to formulate an answer as to what the environmental impact of animal agriculture is, the survey aims at finding out just how much people know about the environmental impact of their food choices and their opinion on governmental actions with regard to the animal agriculture sector. The survey contains 38 questions and deals with a series of sub-questions. In section 5.2 I have discussed the 7 most essential questions in the context of this thesis research: Q7, Q19, Q22, Q28, Q33, Q34 and Q25.

What has become evident is that people do in fact believe their food choices have an impact on the environment and most are also convinced that reducing the daily meat-intake can aid in curbing climate change. What has also become evident is the recognition of a form of neglect on the provision of an extensive informational base on all aspects influencing the environment, including the animal agriculture sector. The majority of respondents did in fact state that they believed they were not being properly informed on the impact of their food choices by governments and the media.

This neglect is in stark contrast with the magnitude of the animal agriculture's impact on the environment. Through the analysis of the survey the importance and urgency of developing appropriate institutional and policy frameworks is underlined. Such frameworks should consist of economy-wide and environmental policies, all the while taking into account the animal agriculture sector and its implications on the environment. (Steinfeld et al., 2006: 222). In other words, a separate sector policy for animal agriculture needs to be developed. Its effects need to be taken into account when designing and implementing policies aimed at addressing the animal agriculture's impact on the environment.

6. Discussion, Conclusion and Implications

This final chapter is intended to summarize the domain base for the research, the key findings including an analytical interpretation regarding the research question and the future directions for research.

3.1. Research Overview

This thesis has presented a secondary, qualitative, explanatory research that uses the deductive reasoning approach for the exploration of the impact of animal agriculture on climate change. After everything discussed above, it must have become clear that the earth's resources are not infinite (Rahmstorf, 2008). When looking into the contributing factors to global climate change, it is important to remember that it is not a peak of greenhouse gases or a peak of oil that should most concern us; it is a peak of everything and this in combination with the lack of awareness as to why exactly it is happening and what the implications are, as well as the lack of an appropriate plan to solve it, is definitely reason for concern. If we do not change the way we are living and more specifically the way we are consuming, then very soon, instead of viewing parameters such as economic, political or military power as a nation's strength, it will be measured by its natural resources and their environmental support systems and how they are managed (Steinfeld et al., 2006). In that perspective, it will not matter how economically viable or stable a country is if it runs out of water or land, or if greenhouse gases and subsequent

climate change reach irreversible proportions, catalyzing the melting of ice caps, the rising sea levels, and the loss of buildings, land, crops and even lives.

The animal agriculture sector places an increasing burden on the environment in the process of providing humans with an increasing demand of food. One of the reasons as to why we keep failing on making progress necessary for balancing food needs, supplies and ecological and human health is that we continue to exclude an important factor in the equation – namely food choice. What has been missing, is the actual implementation of this information into policy-making. Even to this day with the implementation of the Sustainable Development Goals, still nothing is mentioned about limiting one's environmental impact by reducing the consumption of animal-derived products. For it is the increasing demand that drives the production process of the sector. We are essentially living in a world of overproduction caused by overconsumption; a process that is causing environmental degradation in varying areas. Therefore, instead of significant research and development expenditures, there first should be investment in education of which food types and agricultural production systems are the most resource-efficient, providing us with the healthiest food to eat and most importantly food products that have the very smallest global ecological footprint (Oppenlander, 2012).

As with many problems we face as a society, the solution becomes embedded in layers of suppressed information, apathy, lack of clarity and inability to act decisively and in a cooperative fashion on a national or international level (Oppenlander, 2012). Organizations such as the World Wildlife Fund (WWF), Global Footprint Network, Worldwatch Institute, United Nations (UN), and others have established a number of initiatives to assist governments in understanding the current state of our planet, regarding resource depletion. All have related the urgency and have presented a generalized roadmap to a resolution. Suggestions made by these organizations, such as *'moving energy systems away from dependency on fossil fuels, preserving bioproductive areas, and restoring unproductive areas'* (FAO, 2016b) would help reduce demand of certain resources, but they do not properly define all causative factors. While these organizations may recognize that the well-being of human society is ultimately linked to the ecological capital on which it depends, only a few of them properly relate animal agriculture as a contributor to the loss of earth's resources. FAO's report *Livestock's Long Shadow* stated that climate change, deforestation, overgrazing, fisheries collapse, food insecurity and the rapid extinction of species are all part of a single, over-arching problem – namely our rapidly increasing global demand to eat animals (Steinfeld et al., 2006). Our collective choice of food as it involves animals – more specifically the raising and eating of livestock and the harvesting of fish – is one of the largest contributing sectors to global depletion (Oppenlander, 2012, Andersen & Kuhn, 2014 & Steinfeld et al., 2006). Meanwhile, the vast legacy of damage leaves future generations with a debt. Ultimately, environmental issues are social issues in the sense that environmental costs created by some groups and nations are carried out by others, or by the planet as a whole (Steinfeld et al., 2006: 5 – 6).

There was a period when the only thing that humans chose to eat was derived directly from the earth since it was already available. That is no longer the case. We now must actively produce

food and we must not be myopic in our decisions. As a society, our food choice opinions and decisions are shaped by a number of influences – cultural, social and political – but on occasion they seem to be coerced by individuals and organizations that are driven by economic motives, without a full understanding of global depletion and sustainability. One would have to ask, then, how this is this happening and why this information is mismanaged. If we are to survive as a society or species, we must make the correct choices – for our own well-being, for other living things with whom we share this planet, and for all those who will come after us. Now is the time to start working towards a higher level of conscious eating.

Safran Foer wrote a book on the impact of our food choices called *Eating Animals*. In his book Foer states the following:

> *Our food choices are determined by many factors, but reason (even consciousness) is not generally high on the list. There is something about eating animals that tends to polarize: never eat them or never sincerely question eating them; become an activist, or disdain activists. These opposing positions – and the closely related unwillingness to take a position – converge in a suggestion that eating animals matters. If and how we eat animals cuts to something deep. Meat is bound up with the story of who we are and who we want to be, from the book of Genesis to the latest farm bill. It raises significant philosophical questions and is a $140 billion-plus a year industry that occupies nearly a third of the land on the planet, shapes oceans ecosystems, and may well determine the future of earth's climate. And yet we seem able to think only about the edges of the arguments – the logical extremes rather than the practical realities (Safran Foer, 2010: 32).*

We need a better way to talk about meat. We need a way that brings meat to the center of public discussion in the same way that it is often at the center of our plates. This does not require that we pretend we are going to have collective agreement. However strong our intuitions are about what is right for us personally and even about what is right for others, we all know in advance that our positions will clash with those of our neighbors. This is the inevitable reality. Therefore we need to openly discuss it and find a way to reframe it (Safran Foer, 2010: 33)

The relationship between our food choices and true sustainability is well established and our very survival will ultimately depend on bringing this precept to the forefront. It is of no question that worldwide there is a significant concern for becoming sustainable, yet at the same time, there is a lack of accuracy in both defining and quantifying the term, particularly as it is applied to food choice. It is high time that individuals, organizations, and governments start making informed decisions regarding their food choices and start understanding its true impact on the environment.

We all tend to live within our own bubbles, unaware of what might be happening elsewhere in the world. This is particularly true with our direct or indirect use of resources. Awareness of the choices we make on a daily basis and adopting proper decisions will ultimately facilitate a

movement in the right direction. Until this moment, in the words of Richard Oppenlander *'most of us have been comfortably unaware with regard to food responsibility and global depletion.'* (Oppenlander, 2012) Now, we must come to grips with the magnitude and urgency of the problem. The answer to achieving the highest level of sustainability can be found on our plates.

> *Ever day each of us must make choices and then, ultimately, take responsibility for the comprehensive impact of those decisions. Therefore, it seems to be the inherent duty of everyone to make as informed a choice as possible. We should all be committed to understanding the reality and consequences of our diet and the footprint it makes on our environment. (Oppenlander, 2012).*

The magnitude of the animal agriculture's impact on the environment underlines the importance and urgency of developing appropriate institutional and policy frameworks. Such frameworks should consist of economy-wide and environmental policies, all the while taking into account the animal agriculture sector and its implications on the environment (Steinfeld et al., 2006: 222). In other words, a separate sector policy for animal agriculture needs to be developed all the while taking into account its effects when designing and implementing policies aimed at addressing the animal agriculture's impact on the environment. Now is the time to take global actions for local results and move people and planet towards a sustainable future by making conscious decisions on all aspects influencing global climate, including animal agriculture.

3.2. Future Work and Recommendations

Research on the impact of the animal agriculture sector has been done, and it is no longer in doubt that the production processes associated with the animal agriculture sector have an environmental impact. Academics, organizations, journalists, and policy analysts have contributed to the debate on the impact of animal agriculture on the environment. The purpose of this thesis is not advocacy, but rather transparency. The intent of this thesis is to provide an informational base upon which readers can be afforded the opportunity to increase their awareness of food choice as it affects the sustainability of the planet. This thesis could support the arguments of environmentalists, politicians and even animal rights activists across the globe and motivate future researchers and policy makers to consider the statements made throughout the paper when deciding on policies aimed at reducing global climate change while at the same time properly taking the environmental effects of animal agriculture into account.

References

Bibliography

Andersen, K. & Kuhn, K. (2014). *Cowspiracy: The sustainability secret.* United States, California: Earth Aware Editions.

Arnell, N. et al. (2014). *Global-scale climate impact functions: The relationship between climate forcing and impact.* Climate Change 134; 474 – 487.

Arrhenius, S. (1896). On the influence of carbonic acid in the air upon the temperature of the ground. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 5(41), 237–76.

Boykoff, M.T. (2014). *Media discourse on the climate slowdown.* National Climate Change 4; 156 – 158.

Campagnolo, L. et al. (2016). *Can climate policy enhance sustainability?* The Netherlands, Dordrecht: Springer Science+Business Media.

Canavan, C.R. et al. (2016). *The SDGs will require integrated agriculture, nutrition, and health at the community level.* Available online at: https://www.researchgate.net/publication/290598462_The_SDGs_Will_Require_Integrated_Agriculture_Nutrition_and_Health_at_the_Community_Level

Carraro, C. et al. (2010). *How is world sustainability in the climate policy sphere? A scenario assessment of different commitments for curbing CO2 emissions I a sustainability framework.* Available online at: http://www.iemss.org/iemss2010/papers/S11/S.11.10.World%20Sustainability%20in%20the%20Climate%20Policy%20Sphere%20A%20scenario%20assessment%20of%20different%20commitments%20for%20curbing%20CO2%20emissions%20in%20a%20Sustainability%20Framework%20-%20RAMIRO%20PARRADO.pdf

CleanMetrics. (2011). Analytics for the sustainable economy. Available online at: http://www.ewg.org/meateatersguide/eat-smart/

Climate Challenge. (2013). *Climate challenge: De mens en het klimaat.* Available online at: http://www.climatechallenge.be/nl/klimaatverandering-woord-en-beeld/wat-is-klimaatverandering/de-mens-en-het-klimaat.aspx

Dobermann, A. et al. (2013). *Solutions for sustainable agriculture and food systems: Tech- nical report for the post-2015 development agenda.* United States, New York: Thematic Group on Sustainable and Food Systems of the Sustainable Development Solutions Network.

Dryzek, J.S. et al. (2011). *The oxford handbook of climate change and society. Chapter 10: Organized climate change denial.* United Kingdom, Oxford: Oxford University Press

EWG. (2011). Meat eater's guide to climate change and health: Lifecycle assessments: Methodology and results. Available online at: http://static.ewg.org/reports/2011/meateaters/pdf/methodology_ewg_meat_eaters_guide_to_health_and_climate_2011.pdf?_ga=2.187340328.1055498145.1495388235-737194159.1495387855

FAO. (1989). *The state of food and agriculture. World and regional reviews: Sustainable development and natural resource management*. Available online at: http://www.fao.org/docrep/017/t0162e/t0162e.pdf

FAO. (2006a). *World agriculture: towards 2015/2050*. Italy, Rome: Interim Report.

FAO. (2006b). *FAO statistical databases.* Available online at: http://faostat.fao.org/default.aspx

FAO. (2006c). *FAO Report Views Rising Global Dairy, Meat Production as Major Environmental Threat.* Available online at: https://www.organicconsumers.org/news/fao-report-views-rising-global-dairy-meat-production-major-environmental-threat

FAO. (2008). *The state of food and agriculture 2008.* Available online at: http://www.fao.org/3/a-i0100e.pdf

FAO. (2015). *Sustainability assessment of food and agriculture systems (SAFA) for sustainable development*. Available online at: http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/SAFA_for_sustainable_development__01_.pdf

FAO. (2016a). *Sustainability pathways*. Available online at: http://www.fao.org/nr/sustainability/home/en/

FAO. (2016b). *The state of food and agriculture: Climate change, agriculture and food security.* Available online at: http://www.fao.org/3/a-i6030e.pdf

Fourier, J. J. (1827). Memoire sur les temperatures du globe terrestre et des espaces planetaires. *Memoires de l'Academic Royale des Sciences de l'Institute de France VII*; 570 – 604.

Garnett, T. & Godfray, C. (2012). *Sustainable intensification in agriculture. Navigating a course through competing food system priorities.* United Kingdom, Oxford: Food Climate Research Network and the Oxford Martin Programme on the Future of Food, p. 51.

GISS. (n.d.). *GISS surface temperature analysis.* Available online at: https://data.giss.nasa.gov/gistemp/

Global Footprint Network. (n.d.). *Climate change: Carbon footprint.* Available online at: http://www.footprintnetwork.org/our-work/climate-change/

Gormon, Z. (n.d.). Compassionate consumption: How veganism is taking over mainstream Europe. United Kingdom, London: Counterpoint.

Humane Society. (n.d.). *Ag-gag laws keep animal cruelty behind closed doors.* Available online at: http://www.humanesociety.org/issues/campaigns/factory_farming/fact-sheets/ag_gag.html?credit=web_vanity_aggag

Hyner, C. et al. (2015). *A leading cause of everything: One industry that is destroying our planet and our ability to thrive on it.* Available online at: https://journals.law.stanford.edu/stanford-environmental-law-journal-elj/blog/leading-cause-everything-one-industry-destroying-our-planet-and-our-ability-thrive-it

IPCC. (2001). *Climate change 2001: Synthesis report.* Contribution of Working Groups I, II and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change, edited by R. J. Watson and the Core Writing Team. Available online at https://www.ipcc.ch/pdf/climate-changes-2001/synthesis-syr/english/front.pdf

IPCC. (2013). *Climate change 2013: The physical science basis.* Contribution of Working Groups I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. United Kingdom, Cambridge: Cambridge University Press.

IWMI. (2000). *Water supply and demand, 1995 to 2025. Available* online at: http://www.iwmi.cgiar.org/About_IWMI/Strategic_Documents/Annual_Reports/1999-2000/Scientific-WS2025.pdf

Joy, M. (2010). *Why we love dogs, eat pigs and wear cows.* United States, Massachusetts: RedWheel/Weiser, LLC.

Kanter, D.R. et al. (2016). *Evaluating agricultural trade-offs in the age of sustainable development.* Available online at: https://www.researchgate.net/publication/309230139_Evaluating_agricultural_trade-offs_in_the_age_of_sustainable_development

Le Blanc, D. (2015). *Towards integration at last? The sustainable development goals as a network of targets.* United States, New York: DESA Working Paper No. 141. Division for Sustainable Development, United Nations Department of Economic and Social Affairs.

Leonard, D. K. (2006). *The political economy of international development and pro-poor livestock policies.* PPLPI Working Paper 35. Italy, Rome: FAO. Available online at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.488.6918&rep=rep1&type=pdf

Lipper, L. et al. (2014). *Climate-smart agriculture for food security.* Nature Climate Change 4 (12), 1068–1072.

MEA. (2005a). *Ecosystems and human well-being: synthesis*. United States, Washington DC; Island Press.

MEA. (2005b). *Ecosystems and human well-being: biodiversity synthesis*. United States, Washington DC; Island Press.

NASA. (2005). *Global temperature trends: 2005 summation.* Available online at: http://data.giss.nasa.gov/gistem/2005/

Naqvi, S.M.K. & Sejian, V. (2011). Global climate change: Role of livestock. *Asian Journal of Agricultural Sciences, 3(1),* 19 – 25.

NOAA. (2006). *Trends in atmospheric carbon dioxide.* Available online at: https://www.ncdc.noaa.gov/monitoring-references/faq/anomalies.php

NOAA. (2017a). *Global Surface Temperature Anomalies.* NOAA/Earth System Research Laboratory, Global Monitoring Division.

NOAA. (2017b). *History of Earth's surface temperature 1880-2016.* Available online at: https://www.climate.gov/news-features/videos/history-earths-surface-temperature-1880-2016

Oppenlander, R. (2012). *Comfortably unaware: Global depletion and food responsibility: What you choose to eat is killing our planet.* United States, Minneapolis: Langdon Street Press.

Oppenlander, R. (2013). *Food choice and sustainability: Why buying local, eating less meat, and taking baby steps won't work.* United States, Minneapolis: Langdon Street Press.

Pandian, H. (2016). *An exploration of the impact of animal agriculture on human sustainable development and the child health indicator.* Ireland, Dublin: Dissertation for the Dublin Institute of Technology.

Pearson, S. (n.d.). *Environmental Externalities in the policy analysis matrix.* Available online at: https://web.stanford.edu/group/FRI/indonesia/courses/lectures/pearson2/session9/pam9.pdf

Powell, J. L. (2001). *Mysteries of terra firma: The age and evolution of the earth.* United States, New York: Simon & Schuster.

Rahmstorf, S. (2008). *Anthropogenic climate change: Revisiting the facts.* Germany, Potsdam: Potsdam Institute for Climate Impact Research.

Rosegrant, M.W., Cai, X. & Cline, S.A. (2002). *Global water outlook to 2025. Averting an impending crisis. A 2020 vision for food, agriculture and the environment initiative.* International Food Policy Research Institute an International Water Management Institute. Available online at: http://ageconsearch.umn.edu/bitstream/16144/1/fp02ro01.pdf

Siegenthaler, U. et al. (2005). Stable carbon cycle-climate relationship during the late Pleistocene. *Science,* 310(5752): 1313 – 1317.

Smith, P. et al. (2014). *Agriculture, forestry and other land use (AFOLU).* Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. United Kingdom, Cambridge: Cambridge University Press. Available online at: https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf

Smith, T.M. et al. (2008). Improvements to NOAA's Historical Merged Land-Ocean Surface Temperature Analysis. Available online at: https://www.ncdc.noaa.gov/monitoring-references/docs/smith-et-al-2008.pdf

Spahni, R. et al. (2005). Atmospheric methane and nitrous oxide of the late Pleistocene from Antarctic ice cores. *Science,* 310(5752): 1317 – 1321.

Sprinz, D. & Luterbacher, U. (2001). *International relations and global climate change*. Germany, Potsdam: Potsdam Institute for Climate Impact Research.

Steinfeld, H. et al. (2006). *Livestock's long shadow: Environmental issues and options.* Italy, Rome: Food and Agriculture Organization of the United Nations.

ThoughtCo. (2017). What is a simple random sample? Definition and different approaches. Available online at: https://www.thoughtco.com/random-sampling-3026729

Tietenberg, T. (2003). *Environmental and natural resource economics*. Available online at: http://s1.downloadmienphi.net/file/downloadfile7/200/1375238.pdf

Tilman, D. & Clark, M. (2014). *Global diets link environmental sustainability and human health.* Nature 515, 518–522.

Turner, K. et al. (2004). Economic valuation of water resources in agriculture: From the sectoral to functional perspective of natural resource management. Available online at: ftp://ftp.fao.org/agl/aglw/docs/wr27e.pdf

UN. (2015). *Transforming our world: The 2030 agenda for sustainable development.* Available online at: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

UN. (n.d.). *Sustainable development goals.* Available online at: http://www.un.org/sustainabledevelopment/sustainable-development-goals

UNEP. (2005). *Global environment outlook year book 2004/05*. Available online at: http://www.unep.org/geo/yearbook/yb2004/

UNEP. (2010). *Assessing the environmental impacts of consumption and production: Priority products and materials*. A Report of the Working Group on the Environmental Impacts of Products and Materials to the International Panel for Sustainable Resource Management. Available online at: http://www.unep.fr/shared/publications/pdf/DTIx1262xPA-PriorityProductsAndMaterials_Report.pdf

UNESCO. (2005). *Water portal.* Available online at: http://en.unesco.org/themes/water-security

UNFCC. (2000). *Climate change information sheet 22. How human activities produce greenhouse gases.* Available online at http://unfccc.int/cop3/fccc/climate/fact22.htm

UNFCC. (n.d.). *The Paris Agreement.* Available online at: http://unfccc.int/paris_agreement/items/9485.php

Vermeulen, S. J. (2012). *Climate change and food systems.* Annual Review of Environment and Resources, 37(1), 195.

Vidal, J. (2011). *Climate sceptic Willie Soon received $1m from oil companies, papers show*. Available online at: https://www.theguardian.com/environment/2011/jun/28/climate-change-sceptic-willie-soon

Westing, A.H., Fox, W. & Renner, M. (2001*). Environmental degradation as both consequence and cause of armed conflict.* Working Paper prepared for Nobel Peace Laureate Forum participants by PREPCOM subcommittee on Environmental Degradation.

Wikipedia. (n.d.). *Environmental good.* Available online at: https://en.wikipedia.org/wiki/Environmental_good

WorldWatch. (2009). *Livestock and climate change. What if the key actors in climate change are cows, pigs and chickens?*. Available online at: http://www.worldwatch.org/files/pdf/Livestock%20and%20Climate%20Change.pdf

Wu, J. Y. (2014). Everyone vegetarian, world enriching. *Open Journal of Philosophy*, 4(2), 160–165.

Xercavins, V. (1999). *Carrying capacity in east sub-Saharan Africa: A multilevel integrated assessment and a sustainable development approach.* Available online at: http://upcommons.upc.edu/bitstream/handle/2099/1420/13.Carrying+Capacity+in+East+Sub-Saharan+Africa.+A+sustainable+Development+Apporoach.pdf;jsessionid=96BF0C465E0BC2C33BE1E56502F22E5C?sequence=1

Annexes

Annex A: Survey Questionnaire

1. **Which of the following best describes your age group?**
   - ⌋ 12 – 17 years old
   - Δ 18 – 24
   - Δ 25 – 34
   - Δ 35 – 44
   - Δ 45 – 54
   - Δ 55 – 64
   - Δ 65 – 74
   - Δ 75 – 84
   - ⌋ 85 years old or above

2. **Your current status is:**
   - ⌋ Student
   - ⌋ Employed
   - ⌋ Self-employed
   - ⌋ Unemployed
   - ⌋ Retired

3. **What is your gender?**
   - ⌋ Female
   - ⌋ Male

4. **What is your highest degree earned?**
   - ⌋ High school
   - ⌋ Bachelor's degree
   - ⌋ Master's degree
   - ⌋ Doctoral degree
   - ⌋ Other (please specify)

5. **In which income group do you belong if you count your monthly net income?**
   - ⌋ No income
   - ⌋ Student income
   - ⌋ Up to €500
   - Δ €500 – €1000
   - Δ €1000 – €1500
   - Δ €1500 – €2000
   - Δ €2000 – €2500
   - Δ €2500 – €3000
   - ⌋ €3000 or more
   - ⌋ Don't want to answer

6. **What is your religion?**
   - ⎦ Agnosticism
   - ⎦ Atheism
   - ⎦ Buddhism
   - ⎦ Christianity
   - ⎦ Hinduism
   - ⎦ Islam
   - ⎦ Jehovah's Witness
   - ⎦ Judaism
   - ⎦ Spiritualism
   - ⎦ Other (please specify)

7. **How would you characterize your eating habits (diet)?**
   - ⎦ Carnivorous (meat-based diet)
   - ⎦ Flexitarian (occasional consumption of meat)
   - ⎦ Pescetarian (a diet that includes fish or other seafood, but no other types of meat)
   - ⎦ Vegetarian (a diet that excludes meat and fish or other seafood)
   - ⎦ Vegan (abstaining from the use of animal products in their diet and this philosophy is usually extended into other areas of their lives (cosmetics, clothes, household items, etc.)

8. **What is the reason for choosing your diet?**
   - ⎦ You feel bad for the animals (animal suffering)
   - ⎦ You have environmental convictions
   - ⎦ You don't like the taste of meat and/or fish
   - ⎦ Religious traditions
   - ⎦ You love the taste of meat
   - ⎦ Other (please specify)

9. **Have you heard of the United Nations Framework Convention on Climate Change (UNFCCC) and/or the Conference of Parties (COP)?**
   - ⎦ Yes
   - ⎦ No

10. **Have you heard of the Kyoto Protocol?**
    - ⎦ Yes
    - ⎦ No

11. **Have you heard of the 17 Sustainable Development Goals (SDGs), also called Agenda 2030?**
    - ⎦ Yes
    - ⎦ No

12. How concerned are you about the impact of greenhouse gas emissions on the environment?

- ⎦ Extremely concerned
- ⎦ Very concerned
- ⎦ Moderately concerned
- ⎦ Slightly concerned
- ⎦ Not concerned at all

13. How concerned are you about air pollution?

- ⎦ Extremely concerned
- ⎦ Very concerned
- ⎦ Moderately concerned
- ⎦ Slightly concerned
- ⎦ Not concerned at all

14. How well do you feel that you understand global environmental issues?

- ⎦ Extremely well
- ⎦ Very well
- ⎦ Fairly well
- ⎦ Not very well
- ⎦ Not very well

15. According to your understanding, rank the following five global climate change issues in terms of impact on the global environment. (1 is highest impact, 5 is lowest impact)

Air Pollution (caused by greenhouse gas emissions)	
Rising Sea Levels	
Animal Agriculture	
Decreased Polar Ice Cover - Glacial Melt	
Land Degradation	

16. Do you think that the global temperature has risen, stayed the same, or fallen since 1800?

- ⎦ Risen
- ⎦ Stayed the same
- ⎦ Fallen
- ⎦ Unsure

17. Do you think that the evidence on global warming is widely accepted by the scientific community, or do a significant number of scientists have serious doubts?

- ⎦ Widely accepted
- ⎦ Serious doubts
- ⎦ Unsure

18. Do you think that the condition of the environment will be better, worse, or about the same for the next generation if no changes take place?

- ⎦ Better
- ⎦ Worse
- ⎦ Same
- ⎦ Unsure

19. Do you think that human activity is contributing to any increase in global temperatures (= anthropogenic climate change)?

- ⎦ Significantly contributed by humans
- ⎦ Moderately contributed by humans
- ⎦ Not at all – Natural causes can explain any increase in global mean temperatures
- ⎦ Unsure

20. How well do you think the environment can recover on its own from problems caused by humans if no changes take place?

- ⎦ Extremely well
- ⎦ Very well
- ⎦ Moderately well
- ⎦ Slightly well
- ⎦ Not at all

21. Do you feel that all people around the globe are equally responsible for the global climate repair, or should wealthy countries bear more of the responsibility?

- ⎦ Equally responsible
- ⎦ Wealthy more responsible

22. From what you have heard and read in the news, do you think that the seriousness of global climate change has been generally exaggerated, generally correct, or is it generally underestimated?

- ⎦ Exaggerated
- ⎦ Correct
- ⎦ Underestimated
- ⎦ Unsure

23. Since the environment and the global economy are linked, which of the following statements do you agree with more? The environment must be protected, even at the risk of curbing economic growth. OR, Economic growth must be protected, even if the environment suffers to some extent.

- ⎦ Environment must be protected
- ⎦ Economic growth must be protected
- ⎦ Equal priority

24. How much do you think government regulations designed to reduce global warming will help to curb the warming?

⎦ Significantly
⎦ Somewhat
⎦ Not too much
⎦ Not at all

25. Do you think that global climate change can be reduced without individuals making major lifestyle changes, or only if individuals make major lifestyle changes?

⎦ Without major changes
⎦ Only with major changes

26. There is a proposed system called "cap and trade" designed to provide incentive for companies to reduce emissions. Governments would set limits on greenhouse gas emissions and issue permits limiting each company's allowed emissions. Companies exceeding emissions would have to purchase permits from companies that did not use all of their permits. Would you favor or oppose this system?

⎦ In favor
⎦ Opposed

27. Should the United Nations be responsible for generating a binding international agreement to regulate greenhouse gas emissions?

⎦ Yes
⎦ No
⎦ Individual nations are responsible

28. Do you think the food you eat has an environmental impact?

⎦ Yes
⎦ No

29. Do you think a plant-based diet is healthier than a meat-based diet?

⎦ Yes
⎦ No

30. Do you think a plant-based diet is more environmentally friendly than a meat-based diet?

⎦ Yes
⎦ No

31. How likely are you to buy a more expensive product if its packaging is more environmentally-friendly than its competitor's product?

⎦ Extremely likely
⎦ Very likely
⎦ Moderately likely

⎦ Slightly likely
⎦ Not likely at all

32. How willing are you to change your lifestyle to reduce the damage you cause to the environment?

⎦ Extremely willing
⎦ Very willing
⎦ Moderately willing
⎦ Slightly willing
⎦ Not willing at all

33. Do you agree with the following statement: "There are ample ways an individual can fight global warming. Using less energy, taking public transport, installing energy-efficient appliances, using alternative fuels, … all of these things can help. But, surprisingly, choosing not to eat beef and milk can also have an enormous impact in helping to fight climate change."

⎦ Yes
⎦ No

34. Do you feel that the government and the media is providing enough information on the impact of your food choices (mainly animal products) on the environment?

⎦ Yes, I believe we are properly informed on the impact of our food choices on the environment
⎦ No, I do not believe we are properly informed on the impact of our food choices on the environment

35. Would you be willing to take part in actions such as "40 days without meat"?

⎦ Yes, I would take part
⎦ No, I would not take part
⎦ Yes, I already have

36. What are you doing to limit your impact on the environment? How likely are you to (bicycle, shorter shower, …)

	Extremely likely	Very likely	Moderately likely	Slightly likely	Not likely at all
Take your bicycle instead of your car					
Take shorter showers					
Take public transportation					
Buy products from local producers (local farmers)					
Change your lightbulbs to energy-saving light bulbs					

Buy a reusable bottle instead of buying plastic bottles					
Choose reusable bags instead of plastic bags					
Recycle properly					

37. How often, in the past month, did you eat the following:

	Never	Less than 3 times a month	1 – 7 times per week	1 – 3 times per day	4 or more times per day
Dairy (cheese, milk, yoghurt, etc.)					
Chicken (fried chicken, in soup, grilled chicken, etc.)					
Fish and Seafood (tuna, salmon, shrimp, etc.)					
Pork (ham, pork chops, ribs, etc.)					
Beef (steak, meatballs, burgers, etc.)					
Other meat (lamb, duck, veal, etc.)					
Eggs (omelet, in salad, in baked goods, etc.)					
Vegetarian (Quorn, tofu, seitan, etc.)					
Vegan (tofu, tempeh, etc.)					

38. Below are a number of statements. Please read each one and indicate to what extent you agree or disagree with each statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
"Animal agriculture is responsible for 18 percent of greenhouse gas emissions, more than the exhaust from all transportation combined."					
"Livestock is responsible for 65% of all human-related emissions of nitrous oxide – a greenhouse gas with 296 times the global warming potential of carbon dioxide, and which stays in the atmosphere for 150 years."					
"Livestock covers 45% of the earth's total land."					

“Animal agriculture is the leading cause of species extinction, ocean dead zones, water pollution, and habitat destruction.”					
“A farm with 2,500 dairy cows produces the same amount of waste as a city of 411,000 people.”					
“We could see fishless oceans by 2048.”					
"Animal agriculture is responsible for 91% of Amazon destruction."					
"1 hamburger = 660 gallons (2500 liters) of water = equivalent to showering for 2 months."					
"The meat and dairy industry use 1/3 of earth's fresh water."					
"A plant based diet cuts your carbon footprint by 50%."					

Annex B: Survey Data of 100 Respondents

Survey responses from question 1 to question 8

#	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Q.7	Q.8-1	Q.8-2	Q.8-3	Q.8-4	Q.8-5	Q.8-6
1	18 – 24	Student	Female	Bachelor's degree	Student income	Atheism	Vegetarian	1	1	0	0	0	/
2	18 – 24	Student	Male	Bachelor's degree	Student income	Agnosticism	Flexitarian	0	0	0	0	1	/
3	18 – 24	Student	Female	High school	Student income	Agnosticism	Pescetarian	1	1	0	0	0	/
4	18 – 24	Student	Female	High school	Student income	Agnosticism	Carnivorous	0	0	0	0	1	/
5	18 – 24	Student	Female	High school	Student income	Christianity	Flexitarian	0	0	0	0	0	Health
6	18 – 24	Student	Male	Bachelor's degree	Student income	Christianity	Carnivorous	0	0	0	0	1	/
7	18 – 24	Student	Female	Master's degree	No income	Atheism	Pescetarian	0	1	0	0	0	/
8	18 – 24	Student	Female	High school	Student income	None	Vegan	1	0	0	0	0	/
9	25 – 34	Employed	Female	Master's degree	€2000 – €2500	Atheism	Flexitarian	0	0	0	0	1	/
10	18 – 24	Student	Female	Bachelor's degree	No income	Christianity	Carnivorous	0	0	0	0	1	My parents eat meat. I'm used to it and it's the easiest way.
11	18 – 24	Student	Female	Master's degree	Student income	Christianity	Flexitarian	0	0	0	0	1	Cheaper and healthier
12	18 – 24	Student	Female	Bachelor's degree	Up to €500	Christianity	Vegetarian	0	1	0	0	0	/
13	18 – 24	Employed	Male	High school	€1500 – €2000	Atheism	Flexitarian	1	1	0	0	1	/
14	25 – 34	Student	Female	Bachelor's degree	Student income	Atheism	Vegan	1	1	0	0	0	Health
15	25 – 34	Student	Female	Master's degree	Student income	Atheism	Vegetarian	1	1	0	0	0	/
16	18 – 24	Student	Female	Bachelor's degree	Student income	Christianity	Carnivorous	0	0	0	0	0	No specific reason
17	18 – 24	Student	Female	Master's degree	Student income	Christianity	Carnivorous	0	0	0	0	1	/
18	25 – 34	Employed	Female	Master's degree	€1500 – €2000	Christianity	Flexitarian	0	1	0	0	0	/

19	35 – 44	Employed	Male	Doctoral degree	€3000 or more	Buddhism	Vegan	0	0	0	0	1	/
20	18 – 24	Student	Male	Bachelor's degree	Student income	Atheism	Flexitarian	0	0	1	0	0	/
21	18 – 24	Student	Female	High school	Student income	Christianity	Carnivorous	0	0	0	0	1	/
22	18 – 24	Student	Male	Master's degree	Student income	Agnosticism	Vegetarian	1	0	1	0	0	/
23	18 – 24	Student	Female	High school	Student income	Atheism	Carnivorous	0	0	0	0	0	Taste, nutrition value, knowing how to cook
24	18 – 24	Student	Male	High school	Student income	Atheism	Carnivorous	0	0	0	0	1	/
25	18 – 24	Student	Female	Bachelor's degree	Student income	Christianity	Carnivorous	0	0	0	0	1	/
26	65 – 74	Retired	Female	High school	Up to €500	Atheism	Flexitarian	0	0	0	0	1	/
27	18 – 24	Student	Male	Master's degree	Student income	Spiritualism	Flexitarian	0	1	0	0	0	/
28	18 – 24	Student	Female	High school	Student income	Atheism	Flexitarian	1	1	0	0	0	/
29	18 – 24	Student	Female	Bachelor's degree	No income	Atheism	Carnivorous	0	0	0	0	1	I believe that a balanced diet is good for your health, which includes meat too (but not only)
30	18 – 24	Student	Female	Bachelor's degree	Student income	Spiritualism	Flexitarian	1	1	0	0	0	/
31	25 – 34	Student	Male	Master's degree	Student income	Christianity	Carnivorous	0	0	0	0	1	/
32	18 – 24	Student	Female	Bachelor's degree	No income	Christianity	Flexitarian	1	1	0	0	0	/
33	18 – 24	Student	Female	Bachelor's degree	Student income	Agnosticism	Vegetarian	1	1	1	0	0	/
34	45 – 54	Employed	Female	Bachelor's degree	€1500 – €2000	Atheism	Flexitarian	1	1	0	0	0	/
35	25 – 34	Employed	Female	Bachelor's degree	€1000 – €1500	Realism	Vegetarian	1	1	0	0	0	/
36	18 – 24	Student	Female	Bachelor's degree	€500 – €1000	Christianity	Flexitarian	0	0	0	0	0	I don't like cooking meat so I only eat it

													out of home
37	18 – 24	Student	Female	High school	Student income	Agnosticism	Vegetarian	1	1	0	0	0	/
38	25 – 34	Employed	Female	Master's degree	€1000 – €1500	Buddhism	Vegetarian	1	1	0	1	0	/
39	18 – 24	Student	Female	High school	No income	Agnosticism	Vegetarian	1	1	0	0	0	/
40	18 – 24	Employed	Female	Bachelor's degree	€1000 – €1500	Atheism	Flexitarian	1	1	0	0	1	I want to support and improve the living conditions of animals during meat productio n
41	18 – 24	Employed	Female	Master's degree	€2000 – €2500	Atheism	Flexitarian	0	1	0	0	0	/
42	25 – 34	Employed	Male	Master's degree	€2000 – €2500	Christianity	Flexitarian	0	1	0	0	1	/
43	18 – 24	Student	Female	Master's degree	Student income	Christianity	Flexitarian	1	0	0	0	1	/
44	65 – 74	Employed	Male	Bachelor's degree	€2000 – €2500	Agnosticism	Vegan	1	1	0	0	0	Very important: eating meat, fish and dairy products is very unhealthy (see Dr. Greger and nutrition)
45	18 – 24	Student	Male	High school	Student income	Atheism	Flexitarian	0	1	0	0	0	
46	18 – 24	Student	Female	Bachelor's degree	Student income	Atheism	Vegan	1	1	0	0	0	Health
47	18 – 24	Student	Male	Master's degree	Student income	Christianity	Carnivorous	0	0	0	0	1	/
48	18 – 24	Student	Male	High school	Student income	Christianity	Carnivorous	0	0	0	0	1	I do not believe in the existence of ethical consumpti on under capitalism
49	25 – 34	Employed	Female	Bachelor's degree	€1500 – €2000	Atheism	Flexitarian	1	0	0	0	0	/
50	18 – 24	Student	Female	Master's degree	Student income	Atheism	Pescetarian	0	1	0	0	0	/
51	18 – 24	Employed	Male	Bachelor's degree	€1000 – €1500	Atheism	Flexitarian	1	0	0	0	0	/

52	18 – 24	Student	Female	Master's degree	Student income	Atheism	Flexitarian	1	1	0	0	0	/
53	18 – 24	Student	Female	High school	Student income	Christianity	Carnivorous	0	0	0	0	1	Habit
54	65 – 74	Retired	Female	High school	€1000 – €1500	Atheism	Vegan	1	1	1	0	0	/
55	25 – 34	Employed	Male	Master's degree	€2500 – €3000	Atheism	Flexitarian	1	1	0	0	0	/
56	18 – 24	Student	Male	Bachelor's degree	Student income	Islam	Flexitarian	0	0	0	0	1	/
57	25 – 34	Employed	Female	High school	€1500 – €2000	Atheism	Vegan	1	1	0	0	0	Personal health
58	18 – 24	Student	Female	Bachelor's degree	Student income	Atheism	Flexitarian	0	0	0	0	1	/
59	18 – 24	Student	Male	Master's degree	Student income	Atheism	Flexitarian	0	1	0	0	0	/
60	18 – 24	Student	Female	High school	No income	Atheism	Vegetarian	0	1	0	0	0	/
61	18 – 24	Student	Female	Bachelor's degree	Student income	Atheism	Flexitarian	0	1	0	0	0	Staying healthy and having a balanced diet
62	18 – 24	Student	Female	Master's degree	No income	Agnosticism	Flexitarian	0	1	0	0	1	/
63	18 – 24	Student	Female	High school	Student income	Buddhism	Flexitarian	1	0	0	0	0	/
64	18 – 24	Student	Male	Master's degree	Student income	Christianity	Flexitarian	1	1	0	0	0	/
65	18 – 24	Student	Male	Bachelor's degree	€1000 – €1500	Atheism	Carnivorous	0	0	0	0	1	/
66	35 – 44	Self-employed	Female	High school	€1000 – €1500	Christianity	Carnivorous	0	0	0	0	0	Habit
67	18 – 24	Student	Female	High school	No income	Agnosticism	Flexitarian	0	0	0	0	0	No specific reason
68	18 – 24	Student	Female	Bachelor's degree	Student income	Christianity	Flexitarian	1	1	1	0	0	/
69	18 – 24	Student	Female	High school	No income	Christianity	Carnivorous	0	0	0	0	1	/
70	55 – 64	Employed	Female	Bachelor's degree	€1500 – €2000	Atheism	Flexitarian	1	0	0	0	0	/
71	18 – 24	Student	Female	High school	Student income	Atheism	Carnivorous	0	0	0	0	1	/
72	25 – 34	Employed	Male	High school	€1500 – €2000	Agnosticism	Carnivorous	0	0	0	0	1	/

73	18 – 24	Student	Male	Bachelor's degree	No income	Agnosticism	Flexitarian	1	1	0	0	1	Quality, I try to only eat bio and eco meat
74	18 – 24	Student	Male	High school	No income	Atheism	Carnivorous	0	0	0	0	1	Habit: I have been eating meat almost daily since I was little
75	18 – 24	Student	Female	High school	Don't want to answer	Agnosticism	Carnivorous	0	0	0	0	1	/
76	45 – 54	Employed	Female	High school	€2500 – €3000	Christianity	Flexitarian	0	0	0	0	0	Nothing
77	55 – 64	Retired	Female	High school	Don't want to answer	Christianity	Carnivorous	0	0	0	0	1	/
78	18 – 24	Student	Female	Bachelor's degree	Student income	Atheism	Pescetarian	1	1	0	0	0	/
79	18 – 24	Employed	Female	Master's degree	Don't want to answer	Agnosticism	Carnivorous	0	0	0	0	1	/
80	18 – 24	Student	Male	High school	Student income	Agnosticism	Carnivorous	0	0	0	0	1	/
81	45 – 54	Employed	Female	Bachelor's degree	€3000 or more	Christianity	Carnivorous	0	0	0	0	0	Habit
82	35 – 44	Employed	Female	Master's degree	€1500 – €2000	Christianity	Carnivorous	0	0	0	0	1	/
83	18 – 24	Student	Female	Bachelor's degree	No income	Christianity	Carnivorous	0	0	0	0	1	I love fish and seafood as well but there is not an option for selecting both
84	18 – 24	Student	Male	High school	No income	Christianity	Carnivorous	0	0	0	0	1	/
85	25 – 34	Employed	Female	Master's degree	€1000 – €1500	Spiritualism	Vegetarian	1	1	0	0	0	/
86	55 – 64	Employed	Female	Bachelor's degree	€2000 – €2500	Atheism	Flexitarian	0	1	0	0	0	/
87	18 – 24	Student	Female	Bachelor's degree	Student income	Atheism	Flexitarian	0	0	0	0	0	Balanced diet
88	25 – 34	Employed	Male	High school	€1500 – €2000	Christianity	Carnivorous	0	0	0	0	1	/
89	18 – 24	Student	Female	High school	Student income	Atheism	Flexitarian	0	0	0	0	0	No confidence in meat industry > hormones
90	25 – 34	Student	Female	Bachelor's degree	Student income	Spiritualism	Flexitarian	0	0	1	0	0	/

91	25 – 34	Employed	Female	Bachelor's degree	€1500 – €2000	Christianity	Carnivorous	0	0	0	0	1	/
92	25 – 34	Employed	Female	Bachelor's degree	€1000 – €1500	Atheism	Flexitarian	1	0	0	0	0	/
93	25 – 34	Employed	Female	Bachelor's degree	€1000 – €1500	Atheism	Flexitarian	1	0	0	0	0	/
94	25 – 34	Employed	Female	Bachelor's degree	€1500 – €2000	Christianity	Flexitarian	0	0	1	0	0	/
95	25 – 34	Employed	Male	Bachelor's degree	€1500 – €2000	Atheism	Carnivorous	0	0	0	0	1	/
96	25 – 34	Employed	Male	Bachelor's degree	€3000 or more	Atheism	Flexitarian	0	0	0	0	1	/
97	25 – 34	Employed	Female	Bachelor's degree	€1500 – €2000	Atheism	Vegetarian	1	1	0	0	0	It makes me healthier to be a vegetarian (I'm now more commit-ted to what I eat)
98	45 – 54	Self-employed	Female	Bachelor's degree	€2500 – €3000	Agnosticism	Flexitarian	1	1	0	0	0	/
99	45 – 54	Self-employed	Male	Master's degree	€3000 or more	Atheism	Carnivorous	0	0	0	0	1	/
100	25 – 34	Student	Female	High school	Student income	Nothing	Vegetarian	1	0	1	0	0	/

Survey responses from question 9 to question 17

#	***Q.9***	***Q.10***	***Q.11***	***Q.12***	***Q.13***	***Q.14***	***Q.15 -1***	***Q.15 -2***	***Q.15 -3***	***Q.15 -4***	***Q.15 -5***	***Q.16***	***Q.17***
1	Yes	Yes	Yes	Extremely concerned	Extremely concerned	Very well	2	3	1	4	5	Risen	Widely accepted
2	Yes	Yes	Yes	Moderately concerned	Extremely concerned	Fairly well	2	4	3	5	1	Risen	Widely accepted
3	No	Yes	No	Extremely concerned	Extremely concerned	Very well	2	3	1	5	4	Risen	Widely accepted
4	No	Yes	No	Very concerned	Very concerned	Fairly well	1	5	2	4	3	Risen	Unsure
5	No	Yes	No	Moderately concerned	Very concerned	Fairly well	2	1	5	4	3	Risen	Unsure
6	Yes	Yes	Yes	Moderately concerned	Extremely concerned	Fairly well	1	2	3	5	4	Risen	Widely accepted
7	Yes	Yes	Yes	Extremely concerned	Very concerned	Very well	2	3	4	5	1	Risen	Widely accepted
8	No	Yes	No	Moderately concerned	Moderately concerned	Not very well	3	2	1	4	5	Risen	Serious doubts
9	Yes	Yes	Yes	Very concerned	Very concerned	Fairly well	5	3	1	4	2	Risen	Serious doubts
10	No	Yes	No	Slightly concerned	Slightly concerned	Fairly well	1	2	3	4	5	Risen	Widely accepted
11	Yes	Yes	Yes	Moderately concerned	Very concerned	Very well	1	4	2	5	3	Risen	Serious doubts

12	No	Yes	No	Extremely concerned	Extremely concerned	Fairly well	2	3	1	4	5	Risen	Widely accepted
13	Yes	Yes	Yes	Very concerned	Very concerned	Fairly well	1	5	3	2	4	Risen	Widely accepted
14	Yes	Yes	No	Very concerned	Very concerned	Fairly well	2	3	1	5	4	Risen	Widely accepted
15	No	Yes	Yes	Very concerned	Extremely concerned	Not very well	1	5	2	3	4	Risen	Widely accepted
16	Yes	Yes	Yes	Slightly concerned	Moderately concerned	Fairly well	1	5	2	4	3	Risen	Widely accepted
17	Yes	Yes	Yes	Moderately concerned	Very concerned	Fairly well	2	3	5	4	1	Risen	Widely accepted
18	Yes	Yes	No	Very concerned	Moderately concerned	Fairly well	2	3	4	5	1	Risen	Widely accepted
19	Yes	Yes	Yes	Moderately concerned	Extremely concerned	Not very well	5	1	3	4	2	Fallen	Serious doubts
20	No	Yes	Yes	Moderately concerned	Very concerned	Fairly well	4	2	3	5	1	Risen	Serious doubts
21	No	Yes	No	Moderately concerned	Moderately concerned	Fairly well	3	2	4	5	1	Risen	Serious doubts
22	No	Yes	Yes	Very concerned	Very concerned	Very well	5	4	3	2	1	Risen	Widely accepted
23	Yes	Yes	Yes	Moderately concerned	Moderately concerned	Not very well	5	2	4	3	1	Risen	Widely accepted
24	No	No	No	Moderately concerned	Moderately concerned	Not very well	3	5	4	2	1	Risen	Unsure
25	No	Yes	No	Moderately concerned	Moderately concerned	Not very well	1	4	2	3	5	Risen	Widely accepted
26	No	Yes	No	Very concerned	Extremely concerned	Fairly well	1	5	4	3	2	Risen	Serious doubts
27	No	Yes	Yes	Very concerned	Very concerned	Fairly well	2	1	3	5	4	Risen	Widely accepted
28	Yes	Yes	No	Extremely concerned	Extremely concerned	Very well	1	5	2	3	4	Risen	Widely accepted
29	Yes	Yes	Yes	Extremely concerned	Very concerned	Very well	1	3	4	5	2	Risen	Widely accepted
30	Yes	Yes	Yes	Very concerned	Extremely concerned	Extremely well	2	1	4	5	3	Risen	Unsure
31	No	Yes	No	Very concerned	Very concerned	Fairly well	2	4	3	1	5	Risen	Widely accepted
32	Yes	Yes	Yes	Very concerned	Very concerned	Fairly well	1	5	2	3	4	Risen	Unsure
33	Yes	Yes	Yes	Extremely concerned	Very concerned	Extremely well	2	4	1	3	5	Risen	Widely accepted
34	No	No	No	Extremely concerned	Extremely concerned	Not very well	1	5	2	3	4	Risen	Widely accepted
35	Yes	No	No	Very concerned	Very concerned	Fairly well	1	3	2	5	4	Risen	Widely accepted
36	Yes	Yes	No	Very concerned	Very concerned	Very well	2	3	4	5	1	Risen	Serious doubts
37	No	No	No	Very concerned	Very concerned	Fairly well	2	5	1	3	4	Risen	Serious doubts
38	No	No	No	Moderately concerned	Very concerned	Fairly well	1	5	3	4	2	Unsure	Serious doubts
39	No	Yes	Yes	Very concerned	Very concerned	Not very well	2	5	1	3	4	Risen	Unsure
40	Yes	No	Yes	Very concerned	Very concerned	Very well	2	4	1	3	5	Risen	Widely accepted
41	Yes	Yes	No	Extremely concerned	Extremely concerned	Very well	1	5	4	2	3	Risen	Widely accepted
42	Yes	Yes	Yes	Very concerned	Very concerned	Very well	1	5	2	4	3	Risen	Widely accepted
43	Yes	Yes	Yes	Very concerned	Very concerned	Fairly well	1	5	2	3	4	Risen	Widely accepted
44													

45	Yes	Yes	Yes	Extremely concerned	Very concerned	Very well	4	2	5	3	1	Risen	Widely accepted
46	No	Yes	No	Very concerned	Very concerned	Fairly well	3	4	1	2	5	Risen	Widely accepted
47	Yes	Yes	No	Very concerned	Moderately concerned	Not very well	1	3	2	5	4	Risen	Widely accepted
48	No	Yes	Yes	Very concerned	Very concerned	Fairly well	1	4	2	3	5	Risen	Widely accepted
49	No	Yes	No	Moderately concerned	Very concerned	Not very well	1	5	3	2	4	Risen	Widely accepted
50	No	No	No	Very concerned	Very concerned	Not very well	2	5	1	3	4	Risen	Widely accepted
51	No	Yes	Yes	Very concerned	Very concerned	Fairly well	2	4	1	5	3	Risen	Serious doubts
52	Yes	Yes	Yes	Extremely concerned	Extremely concerned	Fairly well	4	5	1	2	3	Risen	Widely accepted
53	No	Yes	No	Not concerned at all	Moderately concerned	Not very well	1	4	2	5	3	Risen	Unsure
54	Yes	Yes	No	Extremely concerned	Extremely concerned	Very well	1	4	2	3	5	Risen	Widely accepted
55	Yes	No	Yes	Moderately concerned	Very concerned	Very well	2	5	1	4	3	Risen	Widely accepted
56	No	No	No	Very concerned	Very concerned	Not very well	1	5	3	2	4	Risen	Unsure
57	No	Yes	Yes	Extremely concerned	Extremely concerned	Extremely well	5	4	1	3	2	Risen	Widely accepted
58	No	Yes	No	Moderately concerned	Very concerned	Fairly well	1	2	4	3	5	Risen	Serious doubts
59	No	Yes	No	Moderately concerned	Slightly concerned	Fairly well	2	4	1	5	3	Risen	Widely accepted
60	No	Yes	Yes	Extremely concerned	Extremely concerned	Fairly well	2	4	1	5	3	Risen	Unsure
61	Yes	No	No	Very concerned	Very concerned	Fairly well	1	5	2	3	4	Risen	Widely accepted
62	Yes	Yes	Yes	Very concerned	Very concerned	Fairly well	3	4	1	5	2	Risen	Widely accepted
63	No	Yes	No	Moderately concerned	Very concerned	Fairly well	1	4	5	2	3	Risen	Unsure
64	Yes	Yes	Yes	Extremely concerned	Extremely concerned	Extremely well	3	1	4	5	2	Risen	Widely accepted
65	Yes	Yes	No	Moderately concerned	Extremely concerned	Very well	1	4	2	3	5	Risen	Widely accepted
66	Yes	Yes	Yes	Very concerned	Very concerned	Fairly well	1	4	2	5	3	Risen	Widely accepted
67	No	Yes	No	Moderately concerned	Moderately concerned	Fairly well	2	3	1	5	4	Risen	Widely accepted
68	No	Yes	Yes	Very concerned	Very concerned	Fairly well	3	1	4	5	2	Risen	Widely accepted
69	No	Yes	No	Slightly concerned	Very concerned	Not very well	1	4	3	5	2	Risen	Widely accepted
70	No	Yes	No	Moderately concerned	Very concerned	Fairly well	1	2	3	4	5	Risen	Serious doubts
71	Yes	Yes	No	Moderately concerned	Very concerned	Very well	2	1	4	5	3	Risen	Serious doubts
72	No	Yes	Yes	Very concerned	Very concerned	Very well	3	5	1	2	4	Risen	Widely accepted
73	Yes	Yes	No	Extremely concerned	Extremely concerned	Fairly well	4	3	1	5	2	Risen	Widely accepted
74	No	No	No	Moderately concerned	Very concerned	Not very well	1	3	4	5	2	Risen	Serious doubts
75	No	Yes	No	Moderately concerned	Moderately concerned	Not very well	1	2	5	4	3	Risen	Widely accepted
76	Yes	Yes	Yes	Moderately concerned	Moderately concerned	Fairly well	5	3	1	4	2	Risen	Unsure

77	No	No	No	Moderately concerned	Moderately concerned	Fairly well	1	3	2	4	5	Risen	Serious doubts
78	No	Yes	Yes	Extremely concerned	Extremely concerned	Extremely well	1	3	2	4	5	Risen	Widely accepted
79	No	Yes	No	Moderately concerned	Very concerned	Fairly well	3	1	5	4	2	Risen	Widely accepted
80	No	Yes	No	Very concerned	Very concerned	Fairly well	3	2	4	5	1	Risen	Widely accepted
81	Yes	Yes	Yes	Very concerned	Very concerned	Fairly well	2	5	1	4	3	Risen	Widely accepted
82	Yes	Yes	No	Moderately concerned	Moderately concerned	Fairly well	1	4	3	5	2	Risen	Widely accepted
83	No	Yes	No	Extremely concerned	Extremely concerned	Very well	2	3	4	5	1	Risen	Widely accepted
84	No	Yes	No	Not concerned at all	N Not concerned at all	Fairly well	3	4	1	2	5	Risen	Widely accepted
85	No	Yes	No	Very concerned	Very concerned	Fairly well	1	4	2	3	5	Risen	Widely accepted
86	Yes	No	No	Moderately concerned	Extremely concerned	Extremely well	3	4	2	5	1	Risen	Serious doubts
87	Yes	Yes	Yes	Very concerned	Very concerned	Fairly well	4	2	1	5	3	Risen	Widely accepted
88	Yes	Yes	No	Moderately concerned	Very concerned	Not very well	2	3	1	5	4	Risen	Widely accepted
89	No	Yes	Yes	Moderately concerned	Very concerned	Not very well	3	4	1	2	5	Risen	Widely accepted
90	No	Yes	No	Moderately concerned	Moderately concerned	Fairly well	3	1	4	5	2	Unsure	Serious doubts
91	No	Yes	Yes	Very concerned	Very concerned	Fairly well	3	2	5	4	1	Risen	Widely accepted
92	No	No	No	Moderately concerned	Moderately concerned	Fairly well	3	1	4	5	2	Risen	Serious doubts
93	No	No	No	Slightly concerned	Very concerned	Fairly well	4	2	1	3	5	Risen	Unsure
94	No	Yes	Yes	Very concerned	Very concerned	Very well	3	1	2	4	5	Risen	Unsure
95	Yes	Yes	Yes	Very concerned	Very concerned	Fairly well	3	2	4	5	1	Risen	Serious doubts
96	No	Yes	No	Very concerned	Very concerned	Very well	1	4	2	5	3	Risen	Serious doubts
97	Yes	Yes	Yes	Very concerned	Very concerned	Not very well	3	5	1	2	4	Risen	Widely accepted
98	Yes	Yes	Yes	Very concerned	Very concerned	Fairly well	3	1	4	5	2	Risen	Widely accepted
99	No	Yes	No	Very concerned	Very concerned	Very well	1	5	2	3	4	Risen	Widely accepted
100	Yes	No	Yes	Very concerned	Extremely concerned	Fairly well	1	2	5	4	3	Risen	Serious doubts

Survey responses from question 18 to question 25

#	***Q.18***	***Q.19***	***Q.20***	***Q.21***	***Q.22***	***Q.23***	***Q.24***	***Q.25***
1	Worse	Significantly	Moderately well	Equally responsible	Correct	Environment must be protected	Somewhat	Only with major changes
2	Worse	Moderately	Slightly well	Equally responsible	Underestimated	Equal priority	Somewhat	Only with major changes
3	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Significantly	Without major changes
4	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Significantly	Without major changes

5	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Not too much	Only with major changes
6	Worse	Significantly	Slightly well	Equally responsible	Correct	Environment must be protected	Somewhat	Only with major changes
7	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Significantly	Without major changes
8	Worse	Significantly	Slightly well	Wealthy more responsible	Correct	Environment must be protected	Somewhat	Only with major changes
9	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Not at all	Only with major changes
10	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Equal priority	Somewhat	Only with major changes
11	Worse	Significantly	Moderately well	Wealthy more responsible	Underestimated	Equal priority	Not too much	Without major changes
12	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
13	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Without major changes
14	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
15	Worse	Significantly	Slightly well	Wealthy more responsible	Correct	Environment must be protected	Somewhat	Only with major changes
16	Worse	Significantly	Slightly well	Equally responsible	Underestimated	Environment must be protected	Significantly	Without major changes
17	Worse	Significantly	Not at all	Wealthy more responsible	Correct	Equal priority	Somewhat	Only with major changes
18	Worse	Significantly	Not at all	Wealthy more responsible	Correct	Equal priority	Somewhat	Only with major changes
19	Worse	Significantly	Extremely well	Equally responsible	Underestimated	Environment must be protected	Significantly	Only with major changes
20	Worse	Significantly	Moderately well	Equally responsible	Underestimated	Equal priority	Somewhat	Only with major changes
21	Worse	Moderately	Moderately well	Equally responsible	Unsure	Equal priority	Somewhat	Without major changes
22	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Significantly	Only with major changes
23	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Significantly	Only with major changes
24	Worse	Moderately	Slightly well	Wealthy more responsible	Correct	Equal priority	Not too much	Only with major changes
25	Worse	Not at all	Slightly well	Wealthy more responsible	Correct	Environment must be protected	Somewhat	Only with major changes
26	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes

27	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
28	Worse	Significantly	Moderately well	Wealthy more responsible	Underestimated	Equal priority	Significantly	Only with major changes
29	Worse	Significantly	Not at all	Wealthy more responsible	Correct	Environment must be protected	Significantly	Only with major changes
30	Worse	Significantly	Slightly well	Equally responsible	Correct	Environment must be protected	Somewhat	Only with major changes
31	Worse	Significantly	Not at all	Wealthy more responsible	Correct	Environment must be protected	Somewhat	Only with major changes
32	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Not too much	Only with major changes
33	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Significantly	Only with major changes
34	Worse	Significantly	Not at all	Wealthy more responsible	Correct	Environment must be protected	Not too much	Only with major changes
35	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
36	Unsure	Moderately	Slightly well	Equally responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
37	Worse	Significantly	Moderately well	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
38	Worse	Significantly	Not at all	Equally responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
39	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Equal priority	Significantly	Only with major changes
40	Worse	Moderately	Slightly well	Equally responsible	Underestimated	Environment must be protected	Not too much	Without major changes
41	Worse	Significantly	Not at all	Wealthy more responsible	Unsure	Environment must be protected	Not too much	Only with major changes
42	Worse	Significantly	Slightly well	Equally responsible	Correct	Environment must be protected	Significantly	Only with major changes
43	Worse	Significantly	Slightly well	Wealthy more responsible	Correct	Equal priority	Not too much	Only with major changes
44	Worse	Moderately	Not at all	Wealthy more responsible	Correct	Environment must be protected	Somewhat	Only with major changes
45	Worse	Significantly	Not at all	Wealthy more responsible	Correct	Equal priority	Somewhat	Only with major changes
46	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
47	Worse	Significantly	Slightly well	Equally responsible	Correct	Equal priority	Significantly	Only with major changes
48	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes

49	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Significantly	Only with major changes
50	Worse	Moderately	Very well	Equally responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
51	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
52	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Equal priority	Somewhat	Only with major changes
53	Worse	Significantly	Not at all	Equally responsible	Correct	Equal priority	Significantly	Without major changes
54	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Not too much	Only with major changes
55	Worse	Significantly	Slightly well	Wealthy more responsible	Correct	Equal priority	Somewhat	Only with major changes
56	Worse	Significantly	Not at all	Equally responsible	Correct	Equal priority	Somewhat	Without major changes
57	Worse	Significantly	Very well	Wealthy more responsible	Underestimated	Environment must be protected	Not at all	Only with major changes
58	Worse	Significantly	Very well	Equally responsible	Correct	Environment must be protected	Significantly	Only with major changes
59	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Equal priority	Not too much	Only with major changes
60	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
61	Worse	Significantly	Not at all	Equally responsible	Correct	Equal priority	Significantly	Without major changes
62	Worse	Significantly	Slightly well	Equally responsible	Unsure	Environment must be protected	Somewhat	Only with major changes
63	Worse	Moderately	Not at all	Wealthy more responsible	Underestimated	Equal priority	Not too much	Only with major changes
64	Worse	Significantly	Slightly well	Equally responsible	Underestimated	Environment must be protected	Not too much	Only with major changes
65	Worse	Significantly	Slightly well	Equally responsible	Underestimated	Environment must be protected	Somewhat	Without major changes
66	Worse	Significantly	Not at all	Wealthy more responsible	Correct	Environment must be protected	Somewhat	Only with major changes
67	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Equal priority	Somewhat	Without major changes
68	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
69	Worse	Significantly	Slightly well	Wealthy more responsible	Correct	Environment must be protected	Somewhat	Without major changes
70	Unsure	Moderately	Moderately well	Wealthy more responsible	Underestimated	Equal priority	Somewhat	Only with major changes

71	Worse	Moderately	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Not too much	Only with major changes
72	Worse	Significantly	Moderately well	Wealthy more responsible	Correct	Environment must be protected	Somewhat	Only with major changes
73	Worse	Significantly	Moderately well	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
74	Worse	Significantly	Slightly well	Wealthy more responsible	Correct	Equal priority	Somewhat	Without major changes
75	Worse	Significantly	Slightly well	Wealthy more responsible	Unsure	Equal priority	Not too much	Only with major changes
76	Worse	Moderately	Moderately well	Equally responsible	Correct	Environment must be protected	Not too much	Only with major changes
77	Worse	Moderately	Moderately well	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
78	Worse	Significantly	Slightly well	Equally responsible	Underestimated	Environment must be protected	Significantly	Only with major changes
79	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Without major changes
80	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Equal priority	Somewhat	Only with major changes
81	Unsure	Significantly	Slightly well	Wealthy more responsible	Correct	Environment must be protected	Not too much	Only with major changes
82	Worse	Significantly	Slightly well	Wealthy more responsible	Correct	Equal priority	Somewhat	Only with major changes
83	Worse	Significantly	Moderately well	Wealthy more responsible	Correct	Environment must be protected	Somewhat	Only with major changes
84	Unsure	Significantly	Moderately well	Equally responsible	Correct	Environment must be protected	Somewhat	Without major changes
85	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Not too much	Only with major changes
86	Worse	Significantly	Moderately well	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
87	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
88	Worse	Significantly	Not at all	Equally responsible	Correct	Environment must be protected	Somewhat	Only with major changes
89	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
90	Worse	Moderately	Not at all	Equally responsible	Correct	Environment must be protected	Not too much	Only with major changes
91	Better	Moderately	Moderately well	Equally responsible	Correct	Environment must be protected	Somewhat	Only with major changes
92	Worse	Significantly	Slightly well	Wealthy more responsible	Correct	Environment must be protected	Somewhat	Without major changes

93	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
94	Worse	Moderately	Moderately well	Equally responsible	Underestimated	Equal priority	Somewhat	Only with major changes
95	Worse	Significantly	Not at all	Wealthy more responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
96	Worse	Significantly	Slightly well	Wealthy more responsible	Underestimated	Equal priority	Not too much	Without major changes
97	Worse	Significantly	Not at all	Equally responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes
98	Worse	Significantly	Slightly well	Wealthy more responsible	Correct	Environment must be protected	Not too much	Only with major changes
99	Worse	Significantly	Slightly well	Wealthy more responsible	Correct	Equal priority	Somewhat	Only with major changes
100	Worse	Significantly	Moderately well	Equally responsible	Underestimated	Environment must be protected	Somewhat	Only with major changes

Survey responses from question 26 to question 35

#	Q.26	Q.27	Q.28	Q.29	Q.30	Q.31	Q.32	Q.33	Q.34	Q.35
1	In favor	Yes	Yes	Yes	Yes	Extremely likely	Extremely willing	Yes	No	Yes, I already have
2	In favor	Yes	Yes	No	Yes	Very likely	Moderately willing	Yes	No	Yes, I would take part
3	In favor	Yes	Yes	Yes	Yes	Slightly likely	Extremely willing	Yes	No	Yes, I already have
4	In favor	Yes	Yes	Yes	Yes	Moderately likely	Moderately willing	Yes	No	Yes, I would take part
5	Opposed	Individual nations are responsible	Yes	No	Yes	Moderately likely	Very willing	Yes	No	Yes, I already have
6	Opposed	Yes	Yes	Yes	Yes	Moderately likely	Slightly willing	Yes	Yes	No, I would not take part
7	In favor	Yes	Yes	Yes	Yes	Very likely	Very willing	Yes	No	Yes, I already have
8	In favor	Yes	Yes	Yes	Yes	Moderately likely	Very willing	Yes	No	Yes, I already have
9	Opposed	Yes	Yes	No	Yes	Very likely	Very willing	Yes	No	Yes, I already have
10	Opposed	Yes	Yes	No	Yes	Not likely at all	Moderately willing	Yes	No	Yes, I would take part
11	In favor	Yes	Yes	No	Yes	Very likely	Moderately willing	Yes	Yes	Yes, I would take part
12	Opposed	Yes	Yes	Yes	Yes	Extremely likely	Very willing	Yes	No	Yes, I already have
13	In favor	Yes	Yes	Yes	Yes	Very likely	Very willing	Yes	No	Yes, I would take part
14	In favor	Yes	Yes	Yes	Yes	Slightly likely	Very willing	Yes	No	Yes, I already have
15	In favor	Yes	Yes	Yes	Yes	Moderately likely	Very willing	Yes	No	Yes, I already have
16	In favor	Yes	Yes	No	Yes	Slightly likely	Slightly willing	No	No	Yes, I would take part
17	Opposed	Yes	No	No	No	Not likely at all	Not willing at all	No	Yes	No, I would not take part
18	In favor	Yes	Yes	Yes	Yes	Not likely at all	Moderately willing	Yes	No	Yes, I would take part

19	In favor	Individual nations are responsible	Yes	No	No	Extremely likely	Extremely willing	No	Yes	No, I would not take part
20	In favor	Individual nations are responsible	Yes	No	Yes	Slightly likely	Very willing	Yes	No	Yes, I would take part
21	In favor	Yes	Yes	No	Yes	Slightly likely	Slightly willing	Yes	No	No, I would not take part
22	In favor	Yes	Yes	Yes	Yes	Extremely likely	Extremely willing	Yes	No	Yes, I already have
23	In favor	Yes	Yes	Yes	Yes	Moderately likely	Slightly willing	Yes	No	Yes, I would take part
24	In favor	Yes	Yes	No	No	Slightly likely	Moderately willing	Yes	No	No, I would not take part
25	In favor	Yes	Yes	No	Yes	Slightly likely	Moderately willing	Yes	No	Yes, I would take part
26	In favor	Yes	Yes	Yes	Yes	Moderately likely	Moderately willing	Yes	No	No, I would not take part
27	Opposed	Yes	Yes	No	Yes	Very likely	Very willing	Yes	No	Yes, I already have
28	In favor	Yes	Yes	No	Yes	Moderately likely	Very willing	Yes	No	Yes, I would take part
29	In favor	Yes	Yes	No	Yes	Very likely	Very willing	No	No	Yes, I would take part
30	Opposed	Yes	Yes	No	Yes	Moderately likely	Very willing	Yes	No	Yes, I would take part
31	In favor	Yes	Yes	Yes	Yes	Moderately likely	Very willing	Yes	Yes	No, I would not take part
32	In favor	Yes	Yes	Yes	Yes	Moderately likely	Moderately willing	No	No	Yes, I would take part
33	In favor	Yes	Yes	Yes	Yes	Moderately likely	Very willing	Yes	Yes	Yes, I already have
34	In favor	Individual nations are responsible	Yes	Yes	Yes	Moderately likely	Very willing	Yes	No	Yes, I already have
35	In favor	Yes	Yes	Yes	Yes	Very likely	Very willing	Yes	No	Yes, I already have
36	In favor	Yes	No	Yes	Yes	Moderately likely	Very willing	Yes	No	Yes, I would take part
37	In favor	Yes	Yes	Yes	Yes	Moderately likely	Very willing	Yes	No	Yes, I already have
38	In favor	Individual nations are responsible	Yes	Yes	Yes	Extremely likely	Very willing	Yes	No	Yes, I already have
39	In favor	Yes	Yes	Yes	Yes	Moderately likely	Very willing	Yes	No	Yes, I already have
40	In favor	Individual nations are responsible	Yes	No	Yes	Very likely	Moderately willing	Yes	Yes	No, I would not take part
41	In favor	Yes	Yes	No	Yes	Moderately likely	Very willing	No	No	No, I would not take part
42	In favor	Yes	Yes	No	Yes	Very likely	Very willing	Yes	No	Yes, I would take part
43	In favor	Yes	Yes	Yes	Yes	Moderately likely	Very willing	Yes	No	Yes, I already have
44	Opposed	Yes	Yes	Yes	Yes	Moderately likely	Moderately willing	Yes	No	Yes, I already have
45	Opposed	Yes	Yes	Yes	Yes	Moderately likely	Moderately willing	Yes	No	No, I would not take part
46	In favor	Yes	Yes	Yes	Yes	Extremely likely	Extremely willing	Yes	No	Yes, I would take part
47	In favor	Individual nations are responsible	Yes	No	Yes	Not likely at all	Moderately willing	Yes	No	No, I would not take part
48	In favor	Yes	Yes	No	Yes	Moderately likely	Very willing	Yes	No	Yes, I would take part
49	In favor	Individual nations are responsible	Yes	Yes	Yes	Moderately likely	Very willing	Yes	No	Yes, I would take part
50	Opposed	Yes	Yes	No	Yes	Very likely	Moderately willing	Yes	Yes	Yes, I already have
51	In favor	Yes	Yes	No	Yes	Moderately likely	Very willing	Yes	No	Yes, I would take part

52	Opposed	Yes	Yes	Yes	Yes	Moderately likely	Very willing	Yes	No	Yes, I already have
53	Opposed	Individual nations are responsible	Yes	Yes	Yes	Slightly likely	Moderately willing	Yes	No	Yes, I would take part
54	Opposed	Yes	Yes	Yes	Yes	Very likely	Very willing	Yes	No	Yes, I already have
55	Opposed	Yes	Yes	No	Yes	Very likely	Very willing	Yes	No	Yes, I would take part
56	In favor	Individual nations are responsible	No	No	No	Very likely	Moderately willing	Yes	Yes	No, I would not take part
57	In favor	Yes	Yes	Yes	Yes	Very likely	Very willing	Yes	No	Yes, I already have
58	In favor	Yes	Yes	Yes	Yes	Moderately likely	Very willing	Yes	No	Yes, I would take part
59	In favor	Yes	Yes	Yes	Yes	Moderately likely	Moderately willing	Yes	No	Yes, I would take part
60	Opposed	Yes	Yes	Yes	Yes	Moderately likely	Extremely willing	Yes	No	Yes, I would take part
61	In favor	Yes	Yes	No	Yes	Slightly likely	Very willing	Yes	No	Yes, I already have
62	Opposed	Yes	Yes	No	Yes	Moderately likely	Very willing	No	No	Yes, I already have
63	In favor	Individual nations are responsible	Yes	Yes	Yes	Not likely at all	Slightly willing	Yes	No	Yes, I already have
64	Opposed	Yes	Yes	No	Yes	Moderately likely	Extremely willing	Yes	No	Yes, I already have
65	In favor	Yes	Yes	No	Yes	Not likely at all	Very willing	Yes	Yes	No, I would not take part
66	Opposed	Yes	Yes	No	Yes	Very likely	Very willing	No	No	Yes, I would take part
67	In favor	Yes	Yes	Yes	Yes	Moderately likely	Moderately willing	Yes	No	Yes, I already have
68	Opposed	Yes	Yes	Yes	Yes	Very likely	Very willing	Yes	No	Yes, I would take part
69	In favor	Individual nations are responsible	Yes	Yes	Yes	Not likely at all	Moderately willing	Yes	No	Yes, I would take part
70	In favor	Yes	Yes	Yes	Yes	Moderately likely	Moderately willing	Yes	No	Yes, I would take part
71	In favor	Yes	Yes	No	No	Extremely likely	Extremely willing	No	Yes	No, I would not take part
72	Opposed	Yes	Yes	No	Yes	Very likely	Moderately willing	Yes	Yes	Yes, I would take part
73	In favor	Yes	Yes	No	Yes	Extremely likely	Moderately willing	Yes	No	Yes, I would take part
74	In favor	Individual nations are responsible	Yes	No	Yes	Slightly likely	Moderately willing	No	No	No, I would not take part
75	In favor	Yes	Yes	Yes	Yes	Moderately likely	Very willing	Yes	No	Yes, I would take part
76	In favor	Yes	Yes	No	No	Moderately likely	Moderately willing	No	Yes	No, I would not take part
77	In favor	Individual nations are responsible	No	No	No	Moderately likely	Moderately willing	Yes	Yes	No, I would not take part
78	Opposed	Individual nations are responsible	Yes	Yes	Yes	Extremely likely	Extremely willing	Yes	No	Yes, I already have
79	In favor	Yes	Yes	No	No	Slightly likely	Moderately willing	Yes	Yes	No, I would not take part
80	Opposed	Yes	Yes	Yes	Yes	Slightly likely	Moderately willing	Yes	No	No, I would not take part
81	In favor	Yes	Yes	Yes	Yes	Slightly likely	Moderately willing	Yes	Yes	No, I would not take part
82	In favor	Individual nations are responsible	Yes	No	Yes	Moderately likely	Moderately willing	Yes	No	Yes, I would take part
83	Opposed	Individual nations are responsible	Yes	No	No	Slightly likely	Very willing	No	No	No, I would not take part
84	In favor	Individual nations are responsible	Yes	No	Yes	Not likely at all	Not willing at all	Yes	Yes	No, I would not take part

85	Opposed	Yes	Yes	Yes	Yes	Extremely likely	Very willing	Yes	No	Yes, I already have
86	Opposed	Yes	Yes	No	Yes	Moderately likely	Very willing	No	Yes	No, I would not take part
87	In favor	Yes	Yes	Yes	Yes	Moderately likely	Moderately willing	Yes	No	Yes, I would take part
88	In favor	Yes	Yes	Yes	Yes	Slightly likely	Moderately willing	Yes	No	No, I would not take part
89	In favor	Yes	Yes	Yes	Yes	Slightly likely	Moderately willing	Yes	No	Yes, I already have
90	In favor	Yes	Yes	Yes	Yes	Extremely likely	Very willing	Yes	No	Yes, I would take part
91	In favor	Individual nations are responsible	Yes	No	No	Very likely	Moderately willing	Yes	Yes	No, I would not take part
92	In favor	Yes	Yes	Yes	Yes	Moderately likely	Moderately willing	Yes	No	Yes, I would take part
93	In favor	Yes	Yes	Yes	Yes	Very likely	Very willing	Yes	No	Yes, I would take part
94	In favor	Yes	Yes	No	No	Very likely	Very willing	Yes	Yes	Yes, I already have
95	In favor	Yes	Yes	No	No	Moderately likely	Very willing	Yes	No	No, I would not take part
96	In favor	Yes	Yes	No	Yes	Slightly likely	Moderately willing	Yes	No	No, I would not take part
97	In favor	Yes	Yes	Yes	Yes	Extremely likely	Very willing	Yes	No	Yes, I already have
98	In favor	Yes	Yes	No	Yes	Moderately likely	Moderately willing	Yes	No	Yes, I already have
99	Opposed	Yes	Yes	No	Yes	Very likely	Moderately willing	Yes	Yes	No, I would not take part
100	In favor	Yes	Yes	Yes	Yes	Very likely	Extremely willing	Yes	No	Yes, I would take part

Survey responses to question 36

#	Q.36-1	Q.36-2	Q.36-3	Q.36-4	Q.36-5	Q.36-6	Q.36-7	Q.36-8
1	Very likely	Extremely likely	Moderately likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Very likely
2	Very likely	Moderately likely	Very likely	Moderately likely	Extremely likely	Slightly likely	Very likely	Extremely likely
3	Slightly likely	Very likely	Extremely likely	Moderately likely	Extremely likely	Moderately likely	Moderately likely	Extremely likely
4	Extremely likely	Slightly likely	Very likely	Very likely	Extremely likely	Very likely	Extremely likely	Very likely
5	Extremely likely	Very likely	Extremely likely	Moderately likely	Very likely	Extremely likely	Extremely likely	Extremely likely
6	Extremely likely	Moderately likely	Very likely	Very likely	Extremely likely	Slightly likely	Extremely likely	Extremely likely
7	Extremely likely	Very likely	Moderately likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
8	Slightly likely	Moderately likely	Very likely	Slightly likely	Moderately likely	Extremely likely	Extremely likely	Very likely
9	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Very likely	Moderately likely
10	Slightly likely	Very likely	Very likely	Moderately likely	Very likely	Moderately likely	Extremely likely	Extremely likely
11	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
12	Extremely likely	Slightly likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
13	Extremely likely	Extremely likely	Very likely	Moderately likely	Slightly likely	Very likely	Extremely likely	Extremely likely
14	Very likely	Very likely	Very likely	Very likely	Very likely	Extremely likely	Extremely likely	Extremely likely

15	Extremely likely	Very likely	Very likely	Moderately likely	Extremely likely	Very likely	Very likely	Extremely likely
16	Extremely likely	Moderately likely	Very likely	Moderately likely	Extremely likely	Extremely likely	Extremely likely	Moderately likely
17	Moderately likely	Slightly likely	Moderately likely	Moderately likely	Very likely	Very likely	Extremely likely	Extremely likely
18	Moderately likely	Very likely	Slightly likely	Moderately likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
19	Moderately likely	Very likely	Not likely at all	Moderately likely	Very likely	Not likely at all	Extremely likely	Moderately likely
20	Not likely at all	Not likely at all	Extremely likely	Very likely	Very likely	Very likely	Very likely	Extremely likely
21	Very likely	Moderately likely	Very likely	Moderately likely	Very likely	Very likely	Very likely	Very likely
22	Very likely	Moderately likely	Moderately likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
23	Very likely	Moderately likely	Extremely likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
24	Extremely likely	Very likely	Extremely likely	Slightly likely	Very likely	Moderately likely	Extremely likely	Very likely
25	Extremely likely	Very likely	Very likely	Not likely at all	Moderately likely	Very likely	Slightly likely	Very likely
26	Moderately likely	Extremely likely	Extremely likely	Moderately likely	Extremely likely	Very likely	Very likely	Extremely likely
27	Extremely likely	Extremely likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
28	Moderately likely	Moderately likely	Very likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Very likely
29	Extremely likely	Very likely	Moderately likely	Very likely	Extremely likely	Very likely	Extremely likely	Extremely likely
30	Extremely likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Very likely
31	Extremely likely	Moderately likely	Not likely at all	Very likely	Very likely	Very likely	Extremely likely	Very likely
32	Extremely likely	Extremely likely	Extremely likely	Moderately likely	Very likely	Moderately likely	Extremely likely	Extremely likely
33	Extremely likely	Extremely likely	Very likely	Very likely	Extremely likely	Extremely likely	Very likely	Very likely
34	Very likely	Extremely likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
35	Extremely likely	Extremely likely	Extremely likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Very likely
36	Slightly likely	Slightly likely	Extremely likely	Very likely	Very likely	Extremely likely	Extremely likely	Extremely likely
37	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
38	Very likely	Very likely	Very likely	Very likely	Very likely	Very likely	Extremely likely	Extremely likely
39	Very likely	Slightly likely	Extremely likely	Moderately likely	Extremely likely	Extremely likely	Extremely likely	Very likely
40	Very likely	Very likely	Extremely likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
41	Extremely likely	Very likely	Extremely likely	Moderately likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
42	Very likely	Very likely	Extremely likely	Moderately likely	Very likely	Extremely likely	Extremely likely	Extremely likely
43	Extremely likely	Moderately likely	Extremely likely	Very likely	Very likely	Extremely likely	Extremely likely	Extremely likely
44	Moderately likely	Moderately likely	Extremely likely	Moderately likely	Very likely	Extremely likely	Extremely likely	Extremely likely
45	Very likely	Slightly likely	Moderately likely	Moderately likely	Very likely	Very likely	Very likely	Very likely
46	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Moderately likely	Extremely likely	Extremely likely
47	Not likely at all	Moderately likely	Not likely at all	Very likely	Extremely likely	Very likely	Extremely likely	Very likely

48	Extremely likely	Moderately likely	Extremely likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
49	Extremely likely	Very likely	Very likely	Very likely	Extremely likely	Moderately likely	Extremely likely	Extremely likely
50	Moderately likely	Very likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Very likely
51	Very likely	Moderately likely	Extremely likely	Very likely	Very likely	Very likely	Moderately likely	Extremely likely
52	Extremely likely	Moderately likely	Extremely likely	Moderately likely	Extremely likely	Extremely likely	Extremely likely	Very likely
53	Moderately likely	Slightly likely	Very likely	N	Very likely	Extremely likely	Very likely	Very likely
54	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
55	Moderately likely	Slightly likely	Moderately likely	Very likely	Extremely likely	Moderately likely	Very likely	Extremely likely
56	Not likely at all	Not likely at all	Not likely at all	Moderately likely	Very likely	Moderately likely	Very likely	Slightly likely
57	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
58	Very likely	Very likely	Extremely likely	Moderately likely	Very likely	Extremely likely	Very likely	Extremely likely
59	Very likely	Moderately likely	Very likely	Very likely	Moderately likely	Extremely likely	Extremely likely	Slightly likely
60	Extremely likely	Extremely likely	Extremely likely	Moderately likely	Extremely likely	Very likely	Extremely likely	Extremely likely
61	Very likely	Very likely	Very likely	Very likely	Very likely	Moderately likely	Very likely	Extremely likely
62	Extremely likely	Moderately likely	Extremely likely	Very likely	Extremely likely	Very likely	Extremely likely	Extremely likely
63	Moderately likely	Extremely likely	Extremely likely	Not likely at all	Very likely	Moderately likely	Extremely likely	Extremely likely
64	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
65	Very likely	Moderately likely	Extremely likely	Slightly likely	Extremely likely	Very likely	Extremely likely	Extremely likely
66	Moderately likely	Extremely likely	Moderately likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
67	Moderately likely	Slightly likely	Extremely likely	Moderately likely	Extremely likely	Extremely likely	Very likely	Very likely
68	Extremely likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
69	Very likely	Extremely likely	Very likely	Slightly likely	Moderately likely	Slightly likely	Extremely likely	Very likely
70	Very likely	Very likely	Very likely	Moderately likely	Very likely	Extremely likely	Extremely likely	Very likely
71	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Very likely	Extremely likely	Extremely likely
72	Extremely likely	Very likely	Very likely	Very likely	Extremely likely	Extremely likely	Very likely	Very likely
73	Extremely likely	Extremely likely	Extremely likely	Moderately likely	Moderately likely	Extremely likely	Extremely likely	Extremely likely
74	Extremely likely	Very likely	Extremely likely	Slightly likely	Very likely	Moderately likely	Very likely	Very likely
75	Slightly likely	Very likely	Slightly likely	Moderately likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
76	Moderately likely	Moderately likely	Slightly likely	Moderately likely	Moderately likely	Moderately likely	Very likely	Moderately likely
77	Moderately likely	Very likely	Moderately likely	Slightly likely	Extremely likely	Slightly likely	Moderately likely	Extremely likely
78	Moderately likely	Very likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
79	Extremely likely	Very likely	Extremely likely	Slightly likely	Extremely likely	Moderately likely	Extremely likely	Extremely likely
80	Extremely likely	Extremely likely	Moderately likely	Not likely at all	Very likely	Very likely	Very likely	Extremely likely

81	Very likely	Extremely likely	Not likely at all	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
82	Moderately likely	Very likely	Moderately likely	Very likely	Extremely likely	Very likely	Extremely likely	Extremely likely
83	Moderately likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Very likely	Extremely likely	Extremely likely
84	Not likely at all	Not likely at all	Not likely at all	Not likely at all	Not likely at all	Not likely at all	Not likely at all	Not likely at all
85	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Very likely	Extremely likely	Extremely likely	Extremely likely
86	Very likely	Very likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
87	Extremely likely	Very likely	Very likely	Moderately likely	Very likely	Very likely	Very likely	Moderately likely
88	Moderately likely	Very likely	Moderately likely	Moderately likely	Very likely	Moderately likely	Moderately likely	Extremely likely
89	Very likely	Moderately likely	Very likely	Very likely	Very likely	Moderately likely	Moderately likely	Extremely likely
90	Moderately likely	Moderately likely	Very likely	Very likely	Moderately likely	Moderately likely	Very likely	Very likely
91	Very likely	Extremely likely	Very likely	Very likely	Very likely	Extremely likely	Extremely likely	Extremely likely
92	Slightly likely	Very likely	Moderately likely	Moderately likely	Very likely	Very likely	Very likely	Very likely
93	Slightly likely	Very likely	Moderately likely	Very likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
94	Very likely	Very likely	Very likely	Very likely	Very likely	Extremely likely	Extremely likely	Very likely
95	Extremely likely	Slightly likely	Very likely	Moderately likely	Very likely	Extremely likely	Extremely likely	Extremely likely
96	Moderately likely	Extremely likely	Not likely at all	Moderately likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
97	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely	Extremely likely
98	Moderately likely	Moderately likely	Slightly likely	Moderately likely	Very likely	Very likely	Very likely	Very likely
99	Very likely	Slightly likely	Moderately likely	Very likely	Very likely	Moderately likely	Very likely	Very likely
100	Extremely likely	Moderately likely	Extremely likely	Extremely likely	Moderately likely	Extremely likely	Extremely likely	Extremely likely

Survey responses to question 37

#	***Q.37-1***	***Q.37-2***	***Q.37-3***	***Q.37-4***	***Q.37-5***	***Q.37-6***	***Q.37-7***	***Q.37-8***	***Q.37-9***
1	Less than 5 times a month	Never	Never	Never	Never	Never	Less than 5 times a month	4 – 7 times per week	4 – 7 times per week
2	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	4 – 7 times per week	Less than 5 times a month
3	1 – 3 times per week	Never	Less than 5 times a month	Never	Never	Never	Less than 5 times a month	Less than 5 times a month	Never
4	1 – 3 times per day	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	4 – 7 times per week	Less than 5 times a month	Never
5	4 – 7 times per week	Never	Less than 5 times a month	Never	Never	Never	Never	1 – 3 times per week	Never
6	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Never
7	1 – 3 times per day	Never	Less than 5 times a month	Never	Never	Never	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month
8	Never	Never	Never	Never	Never	Never	Never	Never	1 – 3 times per week

9	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Never	Never
10	4 – 7 times per week	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Never
11	1 – 3 times per day	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	4 – 7 times per week	Never	Never
12	1 – 3 times per week	Never	Never	Never	Never	Never	Less than 5 times a month	4 – 7 times per week	4 – 7 times per week
13	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	4 – 7 times per week	1 – 3 times per week	Never
14	Never	Never	Never	Never	Never	Never	Never	Never	4 – 7 times per week
15	1 – 3 times per week	Never	Never	Never	Never	Never	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week
16	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Never
17	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Never	Never
18	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	Never	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	Never
19	Never	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	4 – 7 times per week	1 – 3 times per week	4 – 7 times per week
20	1 – 3 times per day	1 – 3 times per week	1 – 3 times per week	Never	1 – 3 times per week	Never	Less than 5 times a month	Less than 5 times a month	Never
21	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Never	Never
22	1 – 3 times per day	Never	Never	Never	Never	Never	1 – 3 times per week	1 – 3 times per day	1 – 3 times per day
23	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Never	Less than 5 times a month	Never	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month
24	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month
25	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Never
26	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week
27	1 – 3 times per day	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month
28	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Never	4 – 7 times per week	Less than 5 times a month	Never
29	1 – 3 times per day	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month
30	1 – 3 times per day	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Never	4 – 7 times per week	4 – 7 times per week	Less than 5 times a month
31	Never	1 – 3 times per week	4 – 7 times per week	Never	1 – 3 times per week	Never	Never	Never	Never
32	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week
33	Less than 5 times a month	Never	Never	Never	Never	Never	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week
34	4 – 7 times per week	Never	Less than 5 times a month	Never	Never	Never	Less than 5 times a month	4 – 7 times per week	4 – 7 times per week

35	1 – 3 times per week	Never	Never	Never	Never	Never	Less than 5 times a month	1 – 3 times per week	1 – 3 times per day
36	1 – 3 times per day	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Never	1 – 3 times per week	Never	Never
37	4 – 7 times per week	Never	Never	Never	Never	Never	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week
38	1 – 3 times per week	Never	Never	Never	Never	Never	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month
39	4 – 7 times per week	Never	Never	Never	Never	Never	1 – 3 times per week	4 – 7 times per week	4 – 7 times per week
40	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month
41	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	4 – 7 times per week	Never	Never
42	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Never
43	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week
44	Never	Never	Never	Never	Never	Never	Never	Never	1 – 3 times per day
45	1 – 3 times per day	1 – 3 times per week	Never	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Never
46	Never	Never	Never	Never	Never	Never	Never	Less than 5 times a month	Less than 5 times a month
47	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Never	Never
48	1 – 3 times per day	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Never	1 – 3 times per week	Less than 5 times a month	Never
49	1 – 3 times per day	Less than 5 times a month	Never	Less than 5 times a month	Less than 5 times a month	Never	Less than 5 times a month	4 – 7 times per week	Never
50	1 – 3 times per day	Never	1 – 3 times per week	Never	Never	Never	1 – 3 times per week	1 – 3 times per week	Never
51	4 – 7 times per week	Less than 5 times a month	1 – 3 times per week	Never	Never	Never	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month
52	1 – 3 times per day	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month
53	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month
54	Never	Never	Never	Never	Never	Never	Never	Never	Never
55	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Never	Never	Never	1 – 3 times per week	Never	Never
56	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month
57	Never	Never	Never	Never	Never	Never	Never	Never	1 – 3 times per week
58	4 – 7 times per week	4 – 7 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Never	4 – 7 times per week	Never	Never
59	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	Never	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month
60	Less than 5 times a month	Never	Never	Never	Never	Never	Less than 5 times a month	4 – 7 times per week	Never
61	1 – 3 times per day	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Never	Never
62	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	Never

63	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month
64	1 – 3 times per day	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	4 – 7 times per week	4 – 7 times per week	4 – 7 times per week
65	1 – 3 times per day	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Never	Never
66	4 – 7 times per week	1 – 3 times per day	1 – 3 times per week	Never	1 – 3 times per week	Never	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week
67	1 – 3 times per day	1 – 3 times per week	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	Never	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month
68	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Never	Less than 5 times a month	Less than 5 times a month	Never	1 – 3 times per week	1 – 3 times per week
69	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Never	Never
70	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week
71	1 – 3 times per day	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per day	Never
72	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Never
73	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month	Never	Less than 5 times a month	Never	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month
74	4 – 7 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Never
75	4 – 7 times per week	4 – 7 times per week	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Never	Never
76	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Never	Never
77	Never	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Never	Never
78	1 – 3 times per week	Never	Less than 5 times a month	Never	Never	Never	Less than 5 times a month	4 – 7 times per week	4 – 7 times per week
79	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	4 – 7 times per week	Never	Never
80	1 – 3 times per day	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Never	Never
81	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Never
82	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Never	Never
83	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Never	Never
84	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	4 – 7 times per week	4 – 7 times per week	Less than 5 times a month	1 – 3 times per week	Never	Never
85	Less than 5 times a month	Never	Never	Never	Never	Never	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week
86	1 – 3 times per week	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	Never
87	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Never	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month
88	4 – 7 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Never

89	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Never
90	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Never	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month
91	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month
92	1 – 3 times per week	4 – 7 times per week	1 – 3 times per week	Never	Less than 5 times a month	Never	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month
93	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Never	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Never
94	4 – 7 times per week	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month
95	1 – 3 times per day	1 – 3 times per day	1 – 3 times per day	1 – 3 times per day	1 – 3 times per day	1 – 3 times per day	1 – 3 times per day	Never	Never
96	4 – 7 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Never	Never
97	4 – 7 times per week	Never	Never	Never	Never	Never	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month
98	1 – 3 times per day	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	Less than 5 times a month	1 – 3 times per week	Less than 5 times a month
99	1 – 3 times per day	4 – 7 times per week	Never	1 – 3 times per week	1 – 3 times per week	Less than 5 times a month	1 – 3 times per week	Never	Never
100	4 – 7 times per week	Never	Never	Never	Never	Never	1 – 3 times per week	Less than 5 times a month	Less than 5 times a month

Survey responses to question 38

#	***Q.38-1***	***Q.38-2***	***Q.38-3***	***Q.38-4***	***Q.38-5***	***Q.38-6***	***Q.38-7***	***Q.38-8***	***Q.38-9***	***Q.38-10***
1	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
2	Agree	No opinion	No opinion	Disagree	Agree	Strongly agree	No opinion	No opinion	Agree	No opinion
3	Agree	Agree	No opinion	No opinion	Agree	Agree	Agree	Disagree	No opinion	Agree
4	Agree	Agree	No opinion	No opinion	Agree	Agree	No opinion	No opinion	Agree	Agree
5	Agree	No opinion	Disagree	Disagree	No opinion	Strongly agree	Disagree	Agree	No opinion	Agree
6	Agree	No opinion	Agree	Disagree	Disagree	Agree	Disagree	Disagree	No opinion	Agree
7	No opinion	Agree	No opinion	No opinion	No opinion	Agree	No opinion		Agree	Agree
8	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
9	Strongly agree	Strongly agree	Agree	Agree	Strongly agree	Agree	Disagree	Agree	Strongly agree	Agree
10	No opinion	Disagree	No opinion	Agree	Agree	Disagree	No opinion	Agree	Agree	Agree
11	No opinion	Agree	Agree	No opinion	No opinion	Agree	Agree	Disagree	No opinion	Disagree
12	Strongly agree	Strongly agree	No opinion	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Agree	Strongly agree	Strongly agree
13	Agree	Agree	Disagree	Disagree	Disagree	Agree	Strongly agree	Agree	Agree	Agree
14	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
15	Agree	Strongly agree	Strongly agree	Agree	Strongly agree	Strongly agree	Strongly agree	Agree	Agree	Strongly agree
16	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion
17	No opinion	No opinion	No opinion	Disagree	No opinion	No opinion	No opinion	No opinion	No opinion	Disagree

18	Strongly agree	Agree	No opinion	Strongly disagree	Agree	Disagree	No opinion	Agree	No opinion	Disagree
19	No opinion	No opinion	No opinion	Disagree	No opinion	Agree	Disagree	Agree	Agree	Disagree
20	No opinion	Agree	No opinion	Agree	Disagree	Disagree	No opinion	Agree	No opinion	No opinion
21	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
22	Agree	No opinion	No opinion	Agree	No opinion	No opinion	Disagree	No opinion	Agree	Agree
23	Agree	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion
24	Agree	Agree	No opinion	Agree	Strongly agree	Strongly agree	Strongly agree	No opinion	No opinion	Agree
25	Strongly agree	Agree	No opinion	Agree	Agree	Agree	No opinion	No opinion	No opinion	Agree
26	Agree	No opinion	No opinion	Strongly agree	No opinion	Agree	Agree	Agree	No opinion	Agree
27	Agree	Agree	No opinion	Disagree	No opinion	Strongly agree	Agree	Agree	Agree	Agree
28	Agree	Agree	Disagree	Disagree	Agree	No opinion	Agree	Agree	Agree	Agree
29	Disagree	No opinion	No opinion	Strongly disagree	Disagree	Agree	Disagree	Strongly disagree	Disagree	No opinion
30	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree
31	Disagree	Agree	No opinion	Disagree	Agree	Disagree	Disagree	Agree	No opinion	Agree
32	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Agree	No opinion	Strongly agree
33	Agree	No opinion	No opinion	Agree	Agree	Agree	Agree	Agree	Agree	Agree
34	Agree	Agree	Agree	Agree	Strongly agree	Strongly agree	Agree	Agree	Strongly agree	Agree
35	Agree	No opinion	Disagree	Disagree	No opinion	No opinion	Disagree	Agree	Agree	Agree
36	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
37	No opinion	No opinion	Agree	No opinion	Agree	Strongly agree	No opinion	No opinion	Agree	Agree
38	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
39	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion
40	Disagree	No opinion	No opinion	Strongly disagree	No opinion	Agree	Disagree	No opinion	Disagree	Disagree
41	Agree	Agree	Agree	Disagree	No opinion	Disagree	No opinion	Agree	Agree	Strongly agree
42	No opinion	No opinion	No opinion	Agree	Agree	Agree	Agree	Agree	Agree	Agree
43	Strongly agree	Strongly agree	No opinion	Strongly agree	No opinion	No opinion	No opinion	Strongly agree	No opinion	Strongly agree
44	No opinion	Agree	Strongly agree	Agree	Agree	Agree	No opinion	No opinion	Agree	Agree
45	Strongly agree	Strongly agree	No opinion	Strongly agree	Strongly agree	Agree	Strongly agree	Strongly agree	Agree	Strongly agree
46	Agree	No opinion	No opinion	Agree	Agree	No opinion	No opinion	No opinion	No opinion	Agree
47	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion
48	Agree	Agree	Agree	Strongly agree	No opinion	Strongly agree	Strongly agree	Agree	Agree	Agree
49	No opinion	No opinion	Disagree	Disagree	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion
50	Agree	Agree	No opinion	Strongly agree	No opinion	Agree	Agree	No opinion	Agree	No opinion
51	Strongly agree	Strongly agree	No opinion	No opinion	Strongly agree	Agree	Strongly agree	Agree	Agree	Strongly agree
52	Agree	Agree	Agree	Disagree	Agree	Agree	Disagree	Disagree	Agree	Agree
53	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
54	Agree	Agree	No opinion	Agree	Strongly agree	No opinion	Disagree	Strongly agree	Strongly agree	Strongly agree
55	No opinion	No opinion	Agree	Agree	No opinion	Strongly agree	No opinion	Agree	Disagree	No opinion
56										

57	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
58	No opinion	No opinion	No opinion	Agree	Agree	Agree	Agree	Agree	No opinion	No opinion
59	Agree	Agree	Disagree	Agree	Strongly agree	Strongly disagree	Disagree	Agree	Agree	Agree
60	Strongly agree	Strongly agree	No opinion	Strongly agree	Strongly agree	Agree	No opinion	Agree	Strongly agree	Agree
61	Agree	No opinion	Agree	Disagree	No opinion	No opinion	No opinion	No opinion	No opinion	Agree
62	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion
63	No opinion	Disagree	Agree	No opinion	Agree	Disagree	No opinion	No opinion	Agree	Agree
64	No opinion	Agree	Strongly disagree	Strongly disagree	Disagree	Strongly agree	Strongly agree	Strongly agree	No opinion	Strongly agree
65	Disagree	Disagree	Agree	Strongly agree	Disagree	Agree	Strongly agree	Agree	Agree	Agree
66	No opinion	No opinion	No opinion	No opinion	No opinion	Agree	Disagree	Strongly agree	Agree	Agree
67	Agree	Agree	No opinion	Agree	Agree	No opinion	No opinion	Strongly agree	Agree	Agree
68	Agree	Agree	Agree	Agree	No opinion	Agree	Agree	Agree	Agree	No opinion
69	Agree	Agree	Agree	Agree	No opinion	No opinion	No opinion	No opinion	Agree	Agree
70	Agree	No opinion	No opinion	No opinion	No opinion	Agree	Disagree	No opinion	Agree	No opinion
71	Strongly disagree	Strongly agree	Agree	Agree	Disagree	Disagree	Disagree	Disagree	Disagree	Strongly disagree
72	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion
73	Agree	No opinion	No opinion	Disagree	Disagree	Agree	Disagree	Strongly agree	Strongly agree	Agree
74	Disagree	Disagree	Agree	Disagree	Disagree	No opinion	Disagree	No opinion	Agree	No opinion
75	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion
76	No opinion	No opinion	No opinion	No opinion	No opinion	Agree	Agree	No opinion	Agree	Agree
77	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	Strongly agree
78	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
79	Disagree	No opinion	No opinion	Disagree	Strongly disagree	Disagree	Disagree	Disagree	Disagree	Disagree
80	Disagree	Disagree	Agree	Disagree	Disagree	Disagree	Disagree	Disagree	Disagree	No opinion
81	No opinion	No opinion	No opinion	Strongly agree	No opinion	No opinion	No opinion	Agree	No opinion	Strongly agree
82	Agree	No opinion	No opinion	No opinion	No opinion	Agree	No opinion	No opinion	No opinion	Agree
83	No opinion	No opinion	No opinion	Disagree	No opinion	Disagree	No opinion	Strongly disagree	No opinion	Disagree
84	Agree	Agree	Disagree	Agree	Agree	Strongly disagree	Agree	Disagree	Disagree	Agree
85	Strongly agree	Strongly agree	Strongly agree	Strongly agree	No opinion	Agree	No opinion	Strongly agree	Strongly agree	Strongly agree
86	Agree	Agree	No opinion	No opinion	No opinion	No opinion	Agree	No opinion	Agree	No opinion
87	No opinion	Agree	No opinion	Agree	Agree	Agree	Agree	Agree	Agree	Agree
88	No opinion	No opinion	Agree	Disagree	No opinion	Agree	No opinion	No opinion	No opinion	No opinion
89	Agree	No opinion	No opinion	No opinion	No opinion	Agree	No opinion	No opinion	No opinion	Agree
90	No opinion	No opinion	Agree	Disagree	No opinion	Strongly agree	Agree	Agree	Strongly agree	Strongly agree
91	No opinion	No opinion	Agree	No opinion	No opinion	Agree	No opinion	No opinion	No opinion	No opinion
92	No opinion	Agree	Agree	No opinion	Agree	Agree	Agree	Agree	No opinion	Agree
93	Agree	Agree	No opinion	Agree	Agree	Agree	Agree	Agree	Agree	Agree
94	Disagree	Disagree	Disagree	Disagree	No opinion	Agree	Disagree	No opinion	No opinion	Agree
95	Disagree	Disagree	Disagree	Disagree	Disagree	Agree	Disagree	Disagree	Disagree	Strongly disagree
96	Agree	Agree	No opinion	No opinion	Agree	No opinion	Disagree	No opinion	Agree	Agree
97	Agree	Agree	Disagree	Agree	Agree	Agree	Agree	Agree	Agree	Strongly agree

98	Agree	Agree	Agree	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	Agree
99	Agree	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion	No opinion
100	Disagree	No opinion	Agree	Agree	Agree	Agree	No opinion	Agree	No opinion	Agree

Annex C: Declaration of Honor

Ik, ondergetekende, aanvaard de volgende voorwaarden en bepalingen van deze verklaring:

In het kader van het uitvoeren van mijn Masterproef aan de Universiteit Antwerpen (UAntwerpen) binnen de faculteit Sociale Wetenschappen, zal ik toegang krijgen tot (technische en andere) informatie van UAntwerpen en/of derde partijen, in geschreven, elektronische, mondelinge, visuele of eender welke andere vorm, met inbegrip van (maar niet beperkt tot) documenten, kennis, data, tekeningen, foto's, filmmateriaal, modellen en materialen. Deze informatie wordt gezamenlijk met informatie voortkomend uit het door mij uitgevoerde onderzoek beschouwd als 'Vertrouwelijke Informatie'.

Ik zal de Vertrouwelijke Informatie uitsluitend aanwenden voor het uitvoeren van het onderzoek in kader van mijn studies binnen UAntwerpen. Ik zal:

a) de Vertrouwelijke Informatie voor geen enkele ander doelstelling gebruiken;
b) de Vertrouwelijke Informatie niet zonder voorafgaande schriftelijke toestemming van UAntwerpen op directe of indirecte wijze publiek maken of aan derden bekendmaken.
c) de Vertrouwelijke Informatie noch geheel noch gedeeltelijk reproduceren.

Aangezien ik bij de creatie van de onderzoeksresultaten in het kader van mijn studies bij UAntwerpen, beroep doe op de universitaire middelen en faciliteiten, draag ik hierbij de vermogensrechten van mijn onderzoek over aan Universiteit Antwerpen.

Voor de uitvoering van mijn werk verbind ik mij ertoe om alle onderzoeksdata en ideeën niet vrij te geven tenzij met uitdrukkelijke toestemming van mijn promotor(en).

Na de beëindiging van mijn Masterproef zal ik alle verkregen Vertrouwelijke Informatie en kopieën daarvan, die nog in mijn bezit zouden zijn, aan UAntwerpen terugbezorgen.

Naam:

Adres:

Geboortedatum en –plaats:

Datum:

Handtekening: