Abstract

Meat production is a human activity driven by meat consumption, a human behaviour normalised in today’s society. Human activity stems from particular psychological patterns (manifesting as human behaviour). It is argued that through regulating the human behaviour of meat consumption the environmentally harmful impacts of the human activity of meat production can potentially be mitigated. In particular, adopting an environmental rights perspective and a social ecological ethic, this article proposes the introduction of a meat tax in South Africa as an innovative means of regulating the human behaviour of meat consumption.

In Section 1 we introduce our arguments and discuss the social, ecological, ethical and environmental rights perspective from which we make them. Next, in Section 2 we discuss some of the most significant environmental harms caused by meat production and thus, indirectly, meat consumption. Then, in Section 3 we critically evaluate the command-and-control regulatory measures that currently regulate the human activity of meat production and seek in no meaningful way to regulate the psychological patterns associated with that human activity, the human behaviour of meat consumption. Lastly, in Section 4 we propose a meat tax, a type of market-based mechanism, as a regulatory measure which we argue could serve to influence human behaviour in order to reduce meat consumption and give better effect to the environmental right.

Keywords

Meat tax; ecologically sustainable development; environmental right; meat production; meat consumption.
1 Introduction

This article proposes the introduction of a meat tax in South Africa as an innovative means of regulating the human behaviour of meat consumption.1 A meat tax is not proposed as a panacea for the socio-ecological harms caused by meat production or meat consumption, but is rather intended to help begin a conversation towards regulatory reform in South Africa.2 Our focus is on the mass production of meat rather than small-scale production, since as we argue below, the processes involved in mass production are particularly harmful to humans and the environment.3 Further, we focus on the regulation of human activity and behaviour. A discussion of animal welfare and animal rights in the context of meat production and consumption falls outside of the scope of this article.4

Meat production is a human activity driven by meat consumption, a particular form of human behaviour normalised in today’s society.5

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1 As provided for in reg 1 of the Regulations Regarding the Classification and Marketing of Meat Intended for Sale in the Republic of South Africa, 2006 (GN 863 in GG 29155 of 1 September 2006), made in terms of Agricultural Product Standards Act 119 of 1990, for the purposes of this article, “meat” connotes “those parts of a carcass which are normally sold for human consumption.”

2 To achieve a sustainable transition to plant-based diets, a meat tax would have to be one of many other regulatory reforms aimed at decreasing the consumption of meat. See Vinnari and Vinnari 2014 J Agric Environ Ethics 383-384 for other possible policy measures.

3 See for example: Anomaly 2015 Public Health Ethics 246-252; Wilson 2019 Forum of Animal Law Studies 46-50. In order to understand what environmental harm is, one must first understand what the ”environment” is. In s 1 of the National Environmental Management Act 107 of 1998 (NEMA), the ”environment” is defined as: “The surroundings within which humans exist and that are made up of – (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.”

4 For a discussion on animal rights and welfare in the context of mass meat production see for example: Puryear, Bruers and Erdös 2017 J Agric Environ Ethics 316-322.

5 Vlek and Steg 2007 JSI 3. In Hornby Oxford Advanced Learner’s Dictionary 14, “human activity” is defined as “a situation in which something is happening, or a lot of things are being done” by a human(s). In Holdershaw and Gendall ”Understanding and Predicting Human Behaviour” 2-3, “human behaviour” is identified as “psychological patterns which respond to internal and external stimuli and can be used as a method to “predict and understand human action”. Thus, human behaviour provides a psychological understanding for human activity. In Vandrovcova
article argues that a shift in focus to the regulation of the human behaviour of meat consumption could serve to mitigate at least some of the harms caused by the human activity of meat production, the latter being the current focus of existing regulatory measures.\textsuperscript{6} Human activity stems from particular psychological patterns (manifesting as human behaviour).\textsuperscript{7} We argue that by interrogating and better regulating these psychological patterns, the harmful effects of meat production could potentially be mitigated.\textsuperscript{8} Human behaviour is responsible for the progression of many environmental harms,\textsuperscript{9} including climate change, which has been proven to be a colossal threat to the environment and human survival.\textsuperscript{10} Moreover, there is a great deal of scientific research evidencing that globally, meat production is a significant contributor to socio-ecological harms, especially climate change.\textsuperscript{11} For instance, it is reported that globally meat production contributes to climate change to a greater degree than the transport industry.\textsuperscript{12} Some of the most significant socio-ecological harms caused by meat production in order to enable mass meat consumption are discussed in Section 2.

In Section 3 we explain that under South African law the socio-ecological impacts of meat production are intended to be regulated primarily by command-and-control measures. These are regulatory measures that "involve setting standards to protect or improve environmental quality" and

\textsuperscript{6} Psychology of Meat Consumption" 7-9, the author argues that habit leads to behaviour formation (patterns), in terms of the theory of "planned behaviour", and thus the consumption of meat is a behaviour fuelled by various factors such as social norms.

\textsuperscript{7} The regulation of human behaviour through market-based mechanisms such as taxation (as will be argued below) forms part of the concept of "behavioural economics". In Miller, Amit and Posten "Behavioral Economics" 1, behavioural economics "explores what affects people's economic decisions and the consequences of those decisions for market prices, returns, and resource allocation."

\textsuperscript{8} Kurz \textit{et al} 2015 \textit{Wiley Interdiscip Rev Clim Change} 114-115.

\textsuperscript{9} Kurz \textit{et al} 2015 \textit{Wiley Interdiscip Rev Clim Change} 113-114; Happer and Wellesley 2019 \textit{Food Security} 125.

\textsuperscript{10} Vlek and Steg 2007 \textit{JSI} 1-2. In Vumbhoni \textit{Critical Analysis of the Law on Duty of Care to the Environment} 15, an "environmental harm" is defined as: "any adverse effect, or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration or frequency) on an environmental value, and includes environmental nuisance"; IPCC \textit{Global Warming of 1.5\degree C} 362.

\textsuperscript{11} See for example UN High Commissioner for Human Rights 2019 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=24735&LangID=E; Kotzé 2014 \textit{JERL} 128-131.

\textsuperscript{12} Poore and Nemecek 2019 \textit{Science} 360 1-2; Petrovic \textit{et al} 2015 \textit{Procedia Food Science} 235-237; FAO \textit{State of Food and Agriculture} 53-71; Tuomisto and Teixeira de Mattos 2011 \textit{Environ Sci Technol} 6117-6123.

Bailey, Frooggatt and Wellesley \textit{Livestock} 2; FAO \textit{State of Food and Agriculture} 64.
imposing a consequence for failure to comply.\textsuperscript{13} We show that in the context of the meat industry, command-and-control measures focus on the regulation of the human activity of meat production (in the form of a "listed activity") rather than the psychological patterns associated with that human activity (the human behaviour of meat consumption).\textsuperscript{14} We argue that command-and-control measures are insufficient to ensure that the environment is protected in a manner that secures ecological sustainability. Accordingly, it is argued that these measures cannot fully give effect to the environmental right provided for in section 24 of the Constitution of the Republic of South Africa, 1996.\textsuperscript{15} The environmental right provides that the environment is to be protected for the benefit of present and future generations "through reasonable legislative and other measures that secure ecologically sustainable development … while promoting justifiable economic and social development."\textsuperscript{16} The entrenchment of this right entails that all legislation and methods of regulation ought to "ensure that development is compatible with the need to protect and improve the environment."\textsuperscript{17}

In Section 4 this article proposes an alternative to imposing merely command-and-control measures by motivating for the introduction of a meat tax, a market-based mechanism which could serve to influence human

\textsuperscript{13} Elazegui 2002 Policy Brief 1.
\textsuperscript{14} Junquera and Del Brio 2016 Sustainability 1; Feris 2006 PELJ 1; Wilson 2005 Fordham Envtl L Rev 224; Zhang 2013 CJPRE 87-88. The human activity of meat production is a listed activity in terms of ss 24(2) and 24D of NEMA and can be found in Environmental Impact Assessment Regulations Listing Notice 1, 2014 (GN R983 in GG 38282 of 4 December 2014) (Listing Notice 1). Several activities related to factory farming are also listed as activities 4, 5, 31 and 32.
\textsuperscript{15} Section 24 of the Constitution of the Republic of South Africa, 1996 (the Constitution) provides that: "Everyone has the right to – (a) an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development." It is of considerable importance that all forms of regulation give effect to the Constitution, as it is the supreme law in South Africa (in terms of s 2 of the Constitution).
\textsuperscript{16} Section 24(b)(iii) of the Constitution.
\textsuperscript{17} Fuel Retailers Association of Southern Africa v Director General: Environmental Management, Department of Agriculture, Conservation and Environment, Mmamalanga Province 2007 6 SA 4 (CC) para 46.
behaviour in order to reduce meat consumption and give better effect to the environmental right.\textsuperscript{18} Market-based mechanisms are defined as:\textsuperscript{19} regulations that encourage behaviour through market signals rather than through explicit directives regarding pollution control levels or methods.

This article proposes the introduction of a meat tax from an environmental rights perspective that adopts a social ecological ethic.\textsuperscript{20} A social ecological ethic sees the environment and humans as "strongly coupled to the point that they should be perceived as one social ecological system."\textsuperscript{21} Further, a social ecological ethic recognises "ecological limits as connected to limits to human flourishing".\textsuperscript{22} This ethic differs from an anthropocentric ethic that views the environment as valuable only to the extent that it furthers human interests.\textsuperscript{23} Rejecting binary thinking towards the normative value placed on the environment, we view human and non-human life as intertwined and interdependent, adopting the point of departure that humans exist in complex social ecological systems, and that the ecological system is "the most encompassing system" known to humans, in that it is the foundation for the existence of all other systems (including socio-economic systems).\textsuperscript{24} Current patterns of meat consumption disregard ecological limits, however, as excessive meat consumption takes place largely in the form of human indulgence to the detriment of the ecology and the well-being of people.\textsuperscript{25}

The environmental rights perspective adopted in this article focusses on securing "ecologically sustainable development" as provided for in section

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\textsuperscript{18} Springmann et al 2018 \textit{PLoS ONE} 6.
\textsuperscript{19} Stavins \textit{Market-based Environmental Policies} 1. As with the command-and-control approach, the concept of market-based mechanisms also plays a large role in this article and will be expounded upon in section 4.
\textsuperscript{20} In Zimmerman and Cliffs 2001 http://dwardmac.pitzer.edu/Anarchist_Archives/bookchin/coceol.html, "social ecology" is described as "the recognition of the often-overlooked fact that nearly all our present ecological problems arise from deep-seated social problems."
\textsuperscript{21} Stockholm Resilience Centre 2015 https://www.stockholmresilience.org/research/research-news/2015-02-19-what-is-resilience.html.
\textsuperscript{22} Murcott "Introducing Transformative Constitutionalism" 292.
\textsuperscript{23} Washington et al 2017 \textit{Ecological Citizen} Y. A critique of the anthropocentric ethic is that it subordinates non-human life to human life, and countenances the exploitation of non-human life to the extent that such exploitation furthers human interests. In the context of the regulation of meat production and consumption such an ethic permits excessive meat production and consumption, despite the harm this activity and behaviour causes to humans and the environment.
\textsuperscript{24} Bosselmann "Ever-increasing Importance of Ecological Integrity" 225.
\textsuperscript{25} De Baker and Dagevos 2012 \textit{J Agric Environ Ethics} 881; Anomaly 2015 \textit{Public Health Ethics} 251. Wilson 2019 \textit{Forum of Animal Law Studies} 46-50. We deliberately use the word "indulgence" because the quantity of meat consumed by people who purchase factory farmed meat is well beyond what is necessary for survival.
24 of the Constitution. In order to protect the environment, section 24 of the Constitution envisages that reasonable legislative and other measures be put in place to secure ecologically sustainable development, whilst promoting only justifiable social and economic development. There is limited scholarship on or judicial engagement with the significance of the Constitution's emphasis on ecological sustainability. Feris argues that ecologically sustainable development entails a "type of sustainable development" that "places emphasis on environmental considerations and as such places the environmental value centre-stage." We agree, but also submit that ecological sustainability connotes "using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased." From this point of departure, ecologically sustainable development entails the systematic acknowledgement of environmental concerns "conceptualised as a set of interconnected ecological pressures that require a similarly interconnected economic, social and political response." Further, development that sustains the ecology calls on people in South Africa to view themselves not only as consumers of the environment but also as custodians thereof. In light of these interconnected environmental concerns, Kotzé argues for law and policy reform that brings forth a "new understanding of the human-environment interface".

A new understanding of the role of law in responding to socio-ecological harms is beginning to emerge in South Africa. For instance, in what is widely regarded as South Africa's first climate change case, the High Court held that in order to pursue sustainable development and intergenerational justice as required by the environmental right, a climate change impact assessment had to be conducted and taken into account before officials

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26. The concept of "ecologically sustainable development" is mentioned in s 24(b)(iii) of the Constitution.
27. Feris 2008 CCR 252 briefly engages with the idea. Also see Murcott "Introducing Transformative Environmental Constitutionalism" 291-292.
28. Feris 2008 CCR 252.
29. Drawing on the Australian experience as discussed in Curran and Hollander 2015 Australas J Environ Manag 3. Also see Kotzé 2014 JERL 150-154.
30. Curran and Hollander 2015 Australas J Environ Manag 3. Also see Murcott "Introducing Transformative Constitutionalism" 292.
31. Murcott 2015 SALJ 903-904.
32. Kotzé 2014 JERL 137.
33. See for instance Ashukem 2017 LEAD Journal 37-43; Peel and Osofsky 2018 TEL 59-60; Humby 2018 JEL 146-154.
could lawfully approve the construction of a coal-fired power plant. This article explores a proposed meat tax as a measure aimed at securing ecologically sustainable development in pursuit of the environmental right in view of the significant influence that tax can have in the social, political and economic realm.

2 Socio-ecological harms associated with meat production

In this section we describe some of the major socio-ecological harms caused by meat production as well as some of the ways in which meat consumption propels meat production, and thus the harms caused thereby. We do so to argue for a shift in regulation from a focus on purely command-and-control measures over environmental harms caused by meat production to the incorporation of a possible market-based mechanism focused on meat consumption.

The activities that take place to mass produce meat are conducted primarily by commercial producers/farmers, auctions and marketing agents, feedlots/factory farms, abattoirs, wholesalers, and retailers. Factory farms and abattoirs generate the greatest amount of greenhouse gas emissions within the production chain, and thus form the focus of this article, when discussing meat production. We illustrate that meat production in factory

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34 Earthlife Africa Johannesburg v Minister of Environmental Affairs [2017] 2 All SA 519 (GP) paras 82-83.
35 Khan 2015 Laws 638-639. Other possible measures are discussed in Vinnari and Vinnari 2014 J Agric Environ Ethics 383-390.
36 For reasons of scope and length, we focus on the relationship between meat production and climate change, as well as the relationships amongst meat production and water security and land degradation and other forms of pollution. Another particularly relevant socio-ecological harm is the spread of disease from animals to humans (zoonosis), as discussed in Anomaly 2015 Public Health Ethics. For various other socio-ecological harms arising from meat production and the need for "sustainable diets" see Fresán and Sabaté 2019 Advances in Nutrition S380-S382.
37 Labuschagne, Louw and Ndanga "Consumer-orientated Study of the South African Beef Value Chain" 7-8.
38 Grobler Regulating the Environmental Impacts of Factory Farming 2. According to s 1(b) of the Health Act 63 of 1977 (the Health Act), a factory farm – also known as a concentrated animal feeding operation (CAFO or factory farm) - is defined as an "intensive animal feeding system means any farming system having as its objective the breeding of animals or the production of meat, milk, eggs, fur or any other product of animal origin and where the animal in question is kept in a confined space so as to accomplish intensive feeding or maximum control of or maximum food conversion in the animal." According to s 1 of the Meat Safety Act 40 of 2000 (the Meat Safety Act), an abattoir is defined as a "slaughter facility in respect of which a registration certificate has been issued." According to Njisane and Muchenje 2017 AJAS 755-756, factory farms and abattoirs are normally on the same premises, in order to
farms contributes to climate change, a critical global socio-ecological problem which, as a more immediate, local concern, is exacerbating South Africa's water crisis and contributing to land degradation and air, waste and water pollution.

2.1 Climate change

Greenhouse gas emissions are the major cause of climate change,\textsuperscript{39} which has been identified as a global threat, and has led numerous countries to enter into treaties and discussions relating to the mitigation of the effects thereof.\textsuperscript{40} The South African government's \textit{National Climate Change Response White Paper, 2011} sets out the country's policy in response to climate change and correctly acknowledges human activity as the primary driver of climate change. However, it would be more precise to acknowledge and engage with the fact that human activity is driven by human behaviour (including consumer behaviour), as human behaviour underlies and drives human activity.\textsuperscript{41} To some extent the White Paper does so. The White Paper states that realising South Africa's commitment to respond to climate change "ultimately will depend on decisions by individual citizens to embrace climate-friendly lifestyles and habits."\textsuperscript{42} A plethora of scientific research, including that conducted under the aegis of the Intergovernmental Panel on Climate Change (IPCC) – a unique body that draws on the work

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\textsuperscript{39} \textit{National Climate Change Response White Paper, 2011} (GN 757 in GG 34695 of 19 October 2011) (White Paper). According to the White Paper 8, climate change is "an ongoing trend of changes in the earth's general weather conditions as a result of an average rise in the temperature of the earth's surface often referred to as global warming. The rise in the average global temperature is due, primarily, to the increased concentration of gases known as greenhouse gases in the atmosphere that are emitted by human activities. These gases [primarily carbon dioxide, nitrous oxide and methane] intensify a natural phenomenon called the 'greenhouse effect' by forming an insulating layer in the atmosphere that reduces the amount of the sun's heat that radiates back into space and therefore has the effect of making the earth warmer."

\textsuperscript{40} According to UN Date Unknown www.un.org/en/sections/issues-depth/climate-change/ 197 countries have ratified the \textit{United Nations Framework Convention on Climate Change} (1992), 192 parties have signed the \textit{Kyoto Protocol to the United Nations Framework Convention on Climate Change} (1998), and 175 countries have signed the \textit{Paris Agreement} (2015).

\textsuperscript{41} In Swim, Clayton and Howard 2011 \textit{Am Psychol} 255; Liverani \textit{Climate Change and Individual Behavior} 2. In Sahney Date Unknown http://www.nptel.ac.in/courses/110105029/pdf%20sahany/Module-1-1.pdf, consumer behaviour is defined as "the interplay of forces that takes place during a consumption process, within a consumers' self and his environment" and which further explains "the reasons and logic that underlie purchasing decisions and consumption patterns."

\textsuperscript{42} White Paper 49.
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of more than one thousand scientists to examine the causes and impacts of climate change – has confirmed this view.\textsuperscript{43}

The IPCC has further provided strong evidence that "changes in climate have caused impacts on natural and human systems on all continents and across the oceans."\textsuperscript{44} A major rise in sea level, ocean acidification, changes in average rainfall patterns, increased flooding and droughts have been identified as some of the impacts of climate change, which also seeps into different aspects of existence and negatively affects "lives, livelihood, health, ecosystems, economies, societies, cultures, services, and infrastructures."\textsuperscript{45}

The human activity of meat production, driven by meat consumption, significantly contributes to climate change, and its dire socio-ecological consequences. Research by, amongst others, the Food and Agriculture Organisation of the United Nations (FAO), which comprises the world's leading researchers and scientists in agricultural matters, indicates that the production of meat contributes about 14.5% to 51% of global greenhouse gas emissions, thus being a primary driver of climate change.\textsuperscript{46} In contrast, the transport industry contributes about 14% of global greenhouse gas emission, and thus arguably has a lesser impact on climate change than the meat production industry.\textsuperscript{47} Yet in climate change discourse, whilst reform of the transport industry is typically explicitly addressed, little regard is

\textsuperscript{43} Chang \textit{et al} 2018 \textit{Hydrol Earth Syst Sci} 4794; OCE 2018 https://www.ipcc.ch/site/assets/uploads/sites/2/2019/03/ST1.5_final_310119.pdf 19.
\textsuperscript{44} IPCC \textit{Climate Change} 2014 4.
\textsuperscript{45} IPCC \textit{Climate Change} 2014 5.
\textsuperscript{46} Goodland and Anhang 2009 https://awellfedworld.org/wp-content/uploads/Livestock-Climate-Change-Anhang-Goodland.pdf 11; FAO 2017 http://www.fao.org/3/i8098EN/i8098en.pdf 1. In FAO \textit{Tackling Climate Change through Livestock} xii, a breakdown of the contributors to greenhouse gas emissions in the meat production sector has been provided as follows: "beef and cattle milk production account for the majority of emissions, respectively contributing 41 and 20 percent of the sector's emissions. Pork and poultry and eggs contribute respectively 9 percent and 8 percent of to the sector's emissions; feed production and processing, and enteric fermentation from ruminants are the two main sources of emissions, representing 45 and 39 percent of sector emissions; manure storage and processing represent 10 percent; the expansion of pasture and feed crops into forests account for about 9 percent of the sector's emissions; the consumption of fossil fuel along the sector supply chains accounts for about 20 percent of sector emissions"; FAIRR 2016 https://cdn.fairr.org/2019/01/09115647/FAIRR_Report_Factory_Farming_Assessing_Investment_Risks.pdf 3; IPCC 2018 https://www.ipcc.ch/site/assets/uploads/2019/08/2f.-Chapter-5_FINAL.pdf 62.
\textsuperscript{47} FAO 2016 http://www.fao.org/3/a-i6340e.pdf 3.
shown to the need to reduce meat consumption and transform meat production practices.\textsuperscript{48}

\subsection*{2.2 Other socio-ecological harms}

As human populations continue to grow and develop neo-liberal capitalist economies that adopt an anthropocentric ethic towards the exploitation of the environment, meat consumption is intensifying, and meat production technology is expanding.\textsuperscript{49} In South Africa the overall estimated population growth rate increased from approximately 1.04\% for the period of 2002 to 2003 to 1.55\% for the period of 2017 to 2018.\textsuperscript{50} Factory farming is a consequence of the need to supply a seemingly ever-growing demand for meat by an expanding population, and accounts for the majority of meat production in South Africa.\textsuperscript{51} Furthermore, approximately 80\% of South Africa's land is used for agricultural purposes and "69\% thereof is used for grazing, which puts significant pressure on agricultural resources".\textsuperscript{52} The reality of South Africa's agricultural landscape is that approximately 60\% of national water is used for watering crops.\textsuperscript{53} The majority of those crops are then fed to animals intended for human consumption.\textsuperscript{54} In this way agriculture for meat production and meat consumption is exacerbating...
South Africa’s water crisis, which is characterised by periodic droughts which are a consequence of climate change.\(^{55}\)

In addition to South Africa’s water crisis, environmental harms from factory farming that also drive climate change\(^{56}\) include land degradation,\(^{57}\) air pollution,\(^{58}\) waste pollution\(^{59}\) and water pollution.\(^{60}\) These are discussed next. Whilst we also acknowledge the harm to and exploitation of animals as a deeply problematic aspect of meat production and meat consumption, a discussion of that harm falls outside of the scope of this article.\(^{61}\)

\(^{55}\) Van Dam 2017 http://edition.cnn.com/2017/05/31/africa/cape-town-drought/index.html.

\(^{56}\) According to Grobler Regulating the Environmental Impacts of Factory Farming 7-8, "ammonia emissions released from livestock manure may contribute to global warming and acidification; surface run-off and groundwater pollution caused by over-application of fertilisers, pesticides and slurry; overgrazing and changes in land utilisation, leading to soil and bank erosion as well as siltation of rivers; and drainage of wetlands and the extension of field margins to river banks may lead to loss of habitats and biodiversity."

\(^{57}\) In terms of art 1(f) of the United Nations Convention to Combat Desertification (1994), "land degradation" is defined as a: "reduction or loss, in arid, semi-arid and dry sub-humid areas, of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes arising from human activities and habitation patterns, such as: 'soil erosion caused by wind and/or water; deterioration of the physical, chemical and biological or economic properties of soil; and long-term loss of natural vegetation'."

\(^{58}\) In terms of s 1 of the National Environmental Management: Air Quality Act 39 of 2004 (NEMQA), "air pollution" is defined as "any change in the composition of the air caused by smoke, soot, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, aerosols and odorous substances".

\(^{59}\) In terms of s 1 of the National Environmental Management: Waste Act 59 of 2008 (NEMWA), "waste pollution" is a form of hazardous waste, which is defined as "any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment."

\(^{60}\) In terms of s 1 of the National Water Act 36 of 1998 (NWA), "water pollution" is defined as "the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it – a) less fit for any beneficial purpose for which it may reasonably be expected to be used; or b) harmful or potentially harmful – aa) to the welfare, health or safety of human beings; bb) to any aquatic or non-aquatic organisms; cc) to the resource quality; or dd) to property."

\(^{61}\) See Puryear, Bruers and Erdős 2017 J Agric Environ Ethics 316-322; Wilson 2019 Forum of Animal Law Studies 48-49. We further support the views expressed in Bilchitz 2012 SAPL 3 with regard to the need to recognise animal rights. However, this article adopts a pragmatic rather than an ethical or philosophical stance towards the human activity of meat production and the human behaviour of meat consumption as a small step towards ecologically sustainable development.
About 14 million cattle are produced in factory farms in South Africa at any given time.\textsuperscript{62} As part of the meat production process, these animals are "kept in restrictive spaces and the animals are bred and slaughtered on the same premises in order to limit expenses and expedite production."\textsuperscript{63} Due to the numerous animals produced on factory farms, overgrazing often occurs, which results in desertification and other forms of land degradation.\textsuperscript{64} Research indicates that desertification takes place in arid, semi-arid and dry, sub-humid areas.\textsuperscript{65} South Africa is a semi-arid country and is thus prone to desertification.\textsuperscript{66} The inevitable methane (28 times more potent than carbon dioxide) emitted by the belching of cattle contributes about 39% to global greenhouse gas emissions by the meat production industry, which results in air pollution.\textsuperscript{67} The typical waste from the slaughter of the animals includes "urine, faeces, discarded milk, blood, detergent, disinfectant, and other waste" and results in waste pollution.\textsuperscript{68} The waste leads to extensive damage to the environment, such as the "reduction of long-term soil fertility, soil erosion, pollution of water supplies, degradation of fragile ecosystems and air pollution caused by methane emissions."\textsuperscript{69} In addition, waste water (filled with high levels of nitrogen and phosphor) can negatively affect the quality of surrounding groundwater and may lead to "severe degradation of aquatic and wetland ecosystems", causing water pollution.\textsuperscript{70}

Even the most effective and rigorous regulation of meat production cannot prevent certain harms, which are an inevitable consequence of meat production. These harms include air pollution caused by the belching of cattle and the repercussions surrounding waste pollution.\textsuperscript{71} With an increase in the demand for meat consumption, the "number of animals bred and slaughtered annually will increase" and as a result animal waste, methane emissions, and the space needed to host animals will also

\begin{thebibliography}{9}
\bibitem{62} Cornelius 2017 http://www.redmeatsa.co.za/wp-content/uploads/2017/03/AMT-Beef-Outlook-February-2017.pdf 2. Also see Goldblatt 2010 http://awsassets.wwf.org.za/downloads/facts_brochure_mockup_04_b.pdf 3 in FAO 2018 http://www.fao.org/3/i8384en/I8384EN.pdf 8.
\bibitem{63} Grobler Regulating the Environmental Impacts of Factory Farming 1.
\bibitem{64} Grobler Regulating the Environmental Impacts of Factory Farming 11.
\bibitem{65} Briassoulis 2018 Land 3.
\bibitem{66} Botai, Botai and Adeola 2018 S Afr J Sci 70, 77.
\bibitem{67} Grossi et al 2019 Animal Frontiers 69.
\bibitem{68} Grobler Regulating the Environmental Impacts of Factory Farming 1-2.
\bibitem{69} Grobler Regulating the Environmental Impacts of Factory Farming 2; Turner Factory Farming and the Environment 27.
\bibitem{70} Grobler Regulating the Environmental Impacts of Factory Farming 8.
\bibitem{71} Grossi et al 2019 Animal Frontiers 69; Turner Factory Farming and the Environment 27.
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increase. Thus, the land degradation, air pollution, waste pollution and water pollution caused by meat production will be compounded, with devastating socio-ecological consequences, particularly given the spectre of climate change.

2.3 The correlation between meat consumption and meat production

South Africa consumes approximately 2.9 million tons of beef, pork and poultry per annum. According to the Bureau for Food and Agriculture, there will be a 38% increase in poultry consumption in the next decade, as well as a 28% increase in beef consumption and a 33% increase in pork consumption. In light of these projections, it was recommended that there should be an increase in the importation of meat products, as the current rate of meat production in South Africa is considered incapable of satiating the high level of meat consumption (despite the increase in the use of commercial farming methods). The high levels of meat consumption are further illustrated by the fact that South Africans consume between 60 to 70 kilograms of meat per person per year, the highest rate of meat consumption in Africa. Furthermore, South Africa has been globally ranked 8th in terms of the highest level of poultry consumption per capita and 16th with regard to beef consumption per capita. Meat production is necessarily propelled by this high level of meat consumption. Yet an increase in meat production will give rise to a concomitant increase in the socio-ecological harms indicated above.

3 The threat of meat production under a command-and-control regulatory method

Under South African environmental law, the socio-ecological harms caused by the human activity of meat production are primarily regulated through

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72 Grobler Regulating the Environmental Impacts of Factory Farming 2.
73 United States Department of Agriculture, Foreign Agricultural Service 2015 https://www.fas.usda.gov/data/south-africa-south-african-meat-market 4.
74 United States Department of Agriculture, Foreign Agricultural Service 2015 https://www.fas.usda.gov/data/south-africa-south-african-meat-market 4.
75 United States Department of Agriculture, Foreign Agricultural Service 2015 https://www.fas.usda.gov/data/south-africa-south-african-meat-market 4.
76 Ritchie and Roser 2017 https://ourworldindata.org/meat-and-seafood-production-consumption.
77 Gous 2018 https://www.timeslive.co.za/news/south-africa/2018-12-10-south-africans-love-meat-but-how-do-we-stack-up-globally/.
78 Ritchie and Roser 2017 https://ourworldindata.org/meat-and-seafood-production-consumption.
command-and-control measures.\textsuperscript{79} In order to explain the links between command-and-control measures and the harms caused by meat production, this section provides an overview of this regulatory method and its shortcomings. This section describes the command-and-control regulatory method in more detail, and argues that it does not adequately give effect to the environmental right in the context of regulating meat production.

3.1 \textit{An overview of the command-and-control regulatory method}

Command-and-control measures\textsuperscript{80} operate in various areas of the South African meat production industry, which is regulated by, among others, the Constitution, NEMA, the \textit{National Environmental Management: Waste Act} (NEMWA), the \textit{National Environmental Management: Air Quality Act} (NEMAQ), the \textit{Health Act}, and the \textit{Conservation of Agricultural Resources Act}.\textsuperscript{81} The command-and-control measures for environmental enforcement involve direct regulation in terms of which polluters are required by law to take certain measures and actions to mitigate the effects of the harms they cause.\textsuperscript{82} These measures are two-fold, as they establish particular legal standards or threshold requirements (which form the command aspects of such measures), and then allow for the enforcement of compliance through the use of certain enforcement mechanisms (which form the control aspects of such measures).\textsuperscript{83}

The command aspect of command-and-control measures is typically implemented in the first instance through administrative measures.\textsuperscript{84} These have the underlying aim of empowering officials to grant permission or authorisation to conduct regulated activities and to direct polluters and other environmental offenders to comply with the law(s) they have contravened and to remedy any harm they may have indirectly or directly caused to the environment.\textsuperscript{85} Compliance notices, directives, abatement notices, and the withdrawal of authorisation to conduct a listed activity are examples of

\begin{itemize}
\item Junquera and Del Brio 2016 \textit{Sustainability} 1; Feris 2006 \textit{PELJ} 1. The human activity of meat production is a listed activity in terms of ss 24(2) and 24D of NEMA and regulated under \textit{Listing Notice 1} (see activities 4, 5, 31 and 32, for instance).
\item See Craigie, Snijman and Fourie “Dissecting Environmental Compliance” 52, 56 and 57.
\item Conservation of Agricultural Resources Act 43 of 1983.
\item Khan Academy Date Unknown https://www.khanacademy.org/economics-finance-domain/microeconomics/consumer-producer-surplus/environmentalregulation/a/command-and-control-regulation-cnx.
\item Winstanley “Administrative Measures" 225.
\item Winstanley "Administrative Measures" 225.
\end{itemize}
administrative measures. In addition, licence or permit systems form part of administrative measures (which "constitute the prime regulatory technique as far as environmental conservation and pollution control are concerned"). A licence or permit system involves the issuing of licences or permits and criminal sanctions for failure to comply with the requirements thereof. An example of a licence system can be found in Chapter 4 of the National Water Act (the NWA), which empowers an official to grant a water use licence for certain water uses, and also empowers officials to issue compliance notices if the water user fails to act in accordance with the licence.

When there is non-compliance with a command, then the control aspect of a command-and-control measure is executed through criminal measures or civil measures. Criminal measures entail the application of criminal law in ensuring environmental compliance (normally manifesting in the form of a fine or incarceration). For instance, in section 151(1)(a) of NWA, a command is established, as it provides that no person may use water otherwise than as permitted under NWA. Section 151(2) of NWA constitutes the control, as it states that any person who contravenes any provision of subsection (1) is guilty of an offence and is liable to a fine or imprisonment. Civil measures are based on the common law (which refers to English and Roman-Dutch custom as it has evolved on a case-by-case basis through judicial precedent), and have been codified in statutes to some degree. Common law remedies consist of abatement orders, interdicts, compensation for damages and judicial review. Following the above example, section 155 of NWA embodies a civil measure, as it states that a High Court may grant an interdict or any other appropriate order against any person who has contravened any provision of NWA. Next, we discuss some of the main command-and-control measures that regulate the meat production process.

3.1.1 Application of command-and-control measures in the setting of meat production

Before constructing a factory farm, an environmental impact assessment must be conducted for the human activities related to factory farming found

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86 Hugo Administrative Penalties 15.
87 Winstanley "Administrative Measures" 225.
88 Winstanley "Administrative Measures" 225.
89 Feris 2006 PELJ 1.
90 Summers "Common-law Remedies for Environmental Protection" 339.
91 Kaka Corporate Self-regulation 17.
An environmental impact assessment forms part of the requirements for the issuing of an environmental authorisation and numerous other licences and permits under various environmental legislation needed for the operation of a factory farm. For instance a water use licence is necessary for: the storage of water, the extraction of water from a water resource, the obstruction of the flow of water in a watercourse, and the disposal of waste in a manner which may have a negative impact on a water resource and cause a change in the characteristics of a watercourse. Furthermore, an atmospheric emission licence is required for manure storage and the processing of animal matter. The operation of a factory farm also requires a waste management licence for the processing of animal waste and the storage of animal manure.

Failure to obtain the necessary environmental authorisation and the other permits and licences required before the commencement of the operation of a factory farm could result in a fine or imprisonment by virtue of various criminal measures imposed under environmental legislation.

One of the major criticisms of command-and-control measures is that all of the commands prescribed by the relevant laws countenance a considerable degree of harm to the environment (discussed in Section 2), albeit within

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92 In terms of reg 1 of the Environmental Impact Assessment Regulations, 2014 (GN R982 in GG 38282 of 4 December 2014) (Environmental Impact Assessment Regulations (2014)) promulgated in terms of NEMA, an "environmental impact assessment" is defined as "a systematic process of identifying, assessing and reporting environmental impacts associated with an activity and includes basic assessment and the scoping and environmental impact reporting process." In Grobler Regulating the Environmental Impacts of Factory Farming 24, the human activities related to factory farming are listed in Listing Notice 1 as follows: activity 4 refers the construction of facilities or buildings used for a high concentration of animals for commercial purposes which exceed certain densities; activity 31 refers to the expansion of facilities or buildings as mentioned in activity 4; activity 5 refers to the construction of facilities or buildings for the concentration of more than 1 000 poultry per facility in an urban area and more than 5 000 poultry per facility outside urban areas, excluding chicks not exceeding the age of 20 days; activity 32 refers to the expansion of the facilities or buildings as mentioned in activity 5.

93 Section 24 of NEMA; s 26(o)(ii) of NWA; s 39 of NEMAQA; s 20(a) of NEMWA.

94 Sections 21 and 22 of NWA.

95 Section 21 of NEMAQA. In terms of activity 19 of Listing Notice 1 "animal matter processing" includes tanning, animal slaughter, rendering plants, animal carcasses, waste disposal or recycling.

96 In terms of Schedule 1 of NEMWA, s 10 refers to animal manure at a facility which processes, treats or stores an excess of tonnes of manure on a monthly basis, and s 11 refers to the processing of animal waste at biogas installations where the facility receives five tonnes or more per day, including animal manure, abattoir waste or vegetable waste.

97 Section 49B of NEMA; s 155 of NWEMWA; s 67 of NEMWA; s 51 of NEMAQA.
prescribed thresholds.\textsuperscript{98} Another criticism is that these measures are reactive in nature, and fail to address the underlying causes of the harmful activity being regulated (meat consumption).\textsuperscript{99} These measures thus offer limited protection to the environment in the context of regulating meat production. Further shortcomings of this method of regulation are discussed next. First, we consider the problematic nature of section 24G of NEMA, which allows for the \textit{ex post facto} authorisation of certain environmentally harmful human activities that commenced without the applicable license. Second, we discuss some of the limitations of criminal sanctions, a principal control measure in the regulation of meat production. We then evaluate whether command-and-control measures are sufficient to give effect to the environmental right provided for in section 24 of the Constitution.

3.2 \textbf{Shortcomings of the command-and-control regulatory method}

Section 24G of NEMA allows for the authorisation of illegally commenced human activities after the fact.\textsuperscript{100} Section 24G has been criticised as it gives a "green light approval to 'over-hasty developers to undertake activities which may have a substantial detrimental effect on the environment'\textquotedbl", and it affords them the possibility of a "quick fix approval" once a development is already complete.\textsuperscript{101} The reactive nature of command-and-control measures, exemplified by section 24G, is one of the numerous shortcomings of this regulatory method, including in the context of meat production, since this provision allows, for instance, the operation of a factory farm to be authorised after its construction with retrospective effect.\textsuperscript{102}

\textsuperscript{98} In Salzman 2013 \textit{Duke Envtl L \\& Pol'y F} 365, it is argued that the command-and-control regulatory method does not encourage innovation because once the "regulated party has satisfied the necessary requirement, the law creates no incentive to reduce harmful activities further." Thus, those harmful activities remain legally perpetual.

\textsuperscript{99} Also see Johnson 1999 \textit{Wash \\& Lee L Rev} 111, who discusses numerous criticisms against the command-and-control regulatory method in relation to environmental law, such as that command and control measures impose: "unreasonable information-gathering burdens and exorbitant costs on government" and "disproportionate burdens on new pollution sources". The author further points out that this method "provides no incentives to polluters to develop new strategies to reduce their pollution beyond the levels required by law."

\textsuperscript{100} Not only does s 24G of NEMA promote the continuance of environmental destructive activity, but the same occurs pursuant to s 22A(4) of the \textit{National Environmental Management Amendment Act} 20 of 2014.

\textsuperscript{101} Kohn 2012 \textit{SAJELP} 3.

\textsuperscript{102} Kohn 2012 \textit{SAJELP} 23.
Criminal prosecutions for violations of the command measures are lengthy, slow and onerous.\textsuperscript{103} This is because the evidence gathered must be capable of proving the alleged violation beyond a reasonable doubt, a challenging burden to discharge (including in cases about harm caused by methane emissions caused by factory farming and water pollution and land degradation arising from poor waste and water management).\textsuperscript{104} Furthermore, officials are normally unwilling to prosecute offenders for environmental offences, as such offences are not traditionally seen as morally wrong.\textsuperscript{105} An additional weakness of criminal measures is that, due to the complex nature of environmental law, highly skilled and knowledgeable prosecutors are needed to prosecute such cases.\textsuperscript{106} There is an insufficient number of experts in this field and judicial officers are not generally exposed to many environmental law cases.\textsuperscript{107} Civil measures face the same problem, as the judicial officers presiding over these cases are not normally exposed to environmental matters and do not receive any kind of standardised training in this field.\textsuperscript{108} In addition, the control aspect of the command-and-control measures is reactive in nature, as it reacts to human activity after harm has occurred, rather than responding to human behaviour to prevent that harm from occurring in the first place.\textsuperscript{109}

Command-and-control measures in the context of regulating the meat industry, because they do not serve to reduce meat consumption, can be criticised as falling short of adequate 'reasonable measures' aimed at the protection of the environment and securing ecologically sustainable development whilst promoting only justifiable social and economic development. This is the case, as the command-and-control measures seek to mitigate some of the harms caused by meat production, but do not serve to reduce meat consumption (the driving force behind meat production).\textsuperscript{110} Furthermore, these measures allow for environmentally harmful activity to take place (within set thresholds) and in circumstances where even illegal environmentally harmful activity (possibly operating outside of the set threshold) can become legal after the fact in terms of section 24G of

\begin{thebibliography}{99}
\bibitem{103} Kidd "Criminal Measures" 242.
\bibitem{104} Kidd \textit{Environmental Law} 270-272.
\bibitem{105} Kidd "Criminal Measures" 243.
\bibitem{106} Fourie 2009 \textit{SAJELP} 1.
\bibitem{107} Fourie 2009 \textit{SAJELP} 1.
\bibitem{108} Craigie, Snijman and Fourie "Dissecting Environmental Compliance" 99.
\bibitem{109} Krishnamoorthy Date Unknown \url{https://www.academia.edu/901450/ENVIRONMENTAL_GOVERNANCE-SHIFT_FROM_COMMAND_AND_CONTROL_MECHANISM_TO_MARKET_DRIVE_N_STRATEGIES}.
\bibitem{110} Junquera and Del Brio 2016 \textit{Sustainability} 1-2.
\end{thebibliography}
Thus, we argue that command-and-control measures are insufficient to give full effect to the environmental right in the context of the regulation of the meat industry. The command-and-control measures in place do not in our view secure ecological sustainability. Their focus is on sustaining economic growth in the meat industry, with limited regard to the destructive socio-ecological consequences thereof. Moreover, command and control measures alone fail to take into account the Earth's ecological limits and the impacts of exceeding those limits.

4 The hope of a meat tax

Taxation can be a tool to "manage behavioural choices made by large numbers of people". A tax, including an environmentally related tax, is a market-based mechanism to regulate human activity and/or human behaviour. Market-based mechanisms are:

regulations that encourage behaviour through market signals rather than through explicit directives regarding control levels or methods.

This in turn encourages "firms (and/or individuals) to undertake control efforts that both are in those firms' (or individuals') interests and that collectively meet policy." This section develops the idea of an environmentally related tax to improve the regulation of the meat industry in the form of a meat tax. We argue that the proposed meat tax could influence human behaviour by reducing meat consumption with the aim of mitigating some of the environmental harms caused by meat production.

4.1 What is the proposed meat tax?

Environmentally related taxes, including on greenhouse gas emissions, are a recognised concept globally. An environmentally related tax is defined as a tax which incorporates the external cost of production or consumption activities, such as the impacts of emissions, in order to address environmental externalities. The nature and extent of environmentally

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111 This argument has been advanced in the above with regard to s 24G of NEMA.
112 Lorenzi 2004 Social Science and Public Policy 59; Carruthers 2016 Fordham L Rev 2566.
113 Miller and Vela 2013 https://www.cbd.int/financial/mainstream/idb-tax.pdf 1.
114 Stavins Market-based Environmental Policies 1.
115 Stavins Market-based Environmental Policies 1.
116 OECD 2006 https://read.oecd-ilibrary.org/environment/the-political-economy-of-environmentally-related-taxes_9789264025530-en#.
117 Brauer et al Use of Market Incentives to Preserve Biodiversity 23, an externality is used to define situations where the activities "of one (or more than one) economic
related taxes is dependent on the scope of the externalities.\textsuperscript{118} Our proposed meat tax would be a tax on the greenhouse gas emissions associated with meat products.\textsuperscript{119} The meat tax would thus arise from the imposition of environmentally related taxes by the state.

Furthermore, we would propose that the meat tax be a "consumption tax". A "consumption tax" is defined as a "levy on expenditure relating to the consumption of goods and services".\textsuperscript{120} The proposed meat tax would differ from other types of consumption taxes, such as value-added tax, since it would take into account the negative externalities stemming from the meat production process (as will be discussed in 4.2.2 below).\textsuperscript{121} We propose that the taxed meat products should be poultry, pork, beef and mutton produced in factory farms (as opposed to seafood), as scientific evidence suggests that these products possess the greatest global warming potential by virtue of the socio-ecological impacts discussed above, and are the meat products in greatest demand in South Africa.\textsuperscript{122} Private consumers (largely unknowingly) indirectly contribute to the greenhouse gas emissions emanating from the human activities of particular entities along the meat production chain, as private consumers encourage the continuation of such activities through the purchase of meat produced by those entities.\textsuperscript{123} Thus, it is arguable that the meat consumption of private consumers should be taxed in order to raise awareness amongst private consumers of the

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agent(s) have consequences on the economic well-being of other agents, without any kind of exchange or transaction occurring between them."
\end{flushleft}

\textsuperscript{118} Moolla, McNamara and Nicholis 2014 https://www.nbi.org.za/wp-content/uploads/2016/06/NBI-Connecting-IPCC-Guidelines-with-Corporate-Standard-April-2015-final-report.pdf 2-3.

\textsuperscript{119} Bahr 2015 TEL 153, 155.

\textsuperscript{120} OECD "Fundamental Principle of Taxation" 32.

\textsuperscript{121} Centemeri 2009 e-cadernos CES 40; Briggs et al 2016 BMC Public Health 11.

\textsuperscript{122} Mann, Reisinger and Bodeker Global Warming Potentials 13, the global warming potential is a climatic metric, which is used to: "compare radiative forcing [the difference of sunlight absorbed by the Earth and energy radiated back to space], the key driver for climate change, over a prescribed time period following pulse emissions of different greenhouse gas emissions." In Van Wyngaard, Meeske and Erasmus 2017 Elsenburg Journal 51, global warming potential considers the following: "concentration [of greenhouse gases] in the atmosphere; how long [greenhouse gases] stays in the atmosphere (lifetime); ability to absorb energy (radiative forcing capacity)."

\textsuperscript{123} In Kotler and Armstrong "Consumer and Industrial Marketing" 35 "private consumers" are "private individuals who purchase goods and services for personal consumption". This sentence illustrates the compatibility of a consumption tax, in the context of this article, and Scope 3 emissions. This is the case, as Scope 3 emissions focus on indirect emissions and the premise of the proposed meat tax is for private consumers to be taxed on the consumption of meat products in the light of the indirect emissions emanating from along the meat production chain.
damaging effects of meat production on ecology and human well-being.\textsuperscript{124} A consumption tax approach to regulating the meat industry is supported elsewhere in the world, including in Denmark and Sweden.\textsuperscript{125} The Swedish Ministry of Agriculture argued for a European tax on meat, as price-based approaches are the most effective in changing consumption patterns.\textsuperscript{126} The South African government has been willing to adopt priced-based approaches to influence consumer behaviour in the context of the implementation of excise taxes on alcoholic beverages and tobacco (known as "sin taxes"). These taxes were intended to raise the awareness (among private consumers) of the link between the consumption of alcohol and tobacco and non-communicable chronic diseases such as liver and lung cancer, respectively.\textsuperscript{127}

4.2 The proposed meat tax in a South African legal setting

In order to understand the potential place of a meat tax in a South African legal setting, we compare and contrast our proposed meat tax with another environmentally related tax, the carbon tax recently introduced by the Carbon Tax Act. We illustrate that a meat tax would be distinguishable from the carbon tax in a number of key ways, and that a meat tax could be introduced as a sin tax under the Customs and Excise Act.\textsuperscript{128} We also engage with some of the arguments against the introduction of such a tax.

4.2.1 The Carbon Tax

In terms of section 1 of the Carbon Tax Act, the "carbon tax" is defined as a "tax on the carbon dioxide equivalent of greenhouse gas emissions". Globally, emissions are divided into three broad categories.\textsuperscript{129} Scope 1 emissions are those from sources that are directly controlled or owned by the relevant entity, such as fuel combustion and the use of a company car.\textsuperscript{130} Scope 2 emissions are those that occur as a result of the "generation of electricity, heating and cooling, or steam that is generated off site" but is

\textsuperscript{124} WWF Climate Change on Your Plate 20, 25.

\textsuperscript{125} FAIRR 2017 https://cdn.fairr.org/2019/01/09120314/meat-tax-probable_final.docx.

\textsuperscript{126} Masselus Tax on Meat 9.

\textsuperscript{127} Stacey \textit{et al} 2017 BMJ Global Health 1-2. According to WHO 2018 https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases, "non-communicable disease" (also known as chronic diseases) are the result "of a combination of genetic, physiological, environmental and behavioural factors".

\textsuperscript{128} Customs and Excise Act 91 of 1964.

\textsuperscript{129} See for example, United States Environmental Protection Agency Date Unknown https://www.epa.gov/greeningepa/greenhouse-gases-epa.

\textsuperscript{130} Goitom 2015 http://www.loc.gov/law/foreign-news/article/south-africa-carbon-tax-legislation-proposed/.
purchased by the respective entity.\textsuperscript{131} Scope 3 emissions are indirect emissions that do not form part of Scope 2 emissions and emanate from sources that are not owned or controlled by an entity but are directly related to the activities of that entity.\textsuperscript{132}

The carbon tax is conveyed in section 6 of the \textit{Carbon Tax Act} as a levy that considers allowances, emissions offsets, the tax rate, and the tax period in which the tax will be levied. The carbon tax is further levied on Scope 1 emissions (though the \textit{Carbon Tax Act} does not explicitly mention the Scope 1 categorisation).\textsuperscript{133} Therefore, the South African carbon tax currently targets producers such as manufacturers, and industrial consumers rather than private consumers.\textsuperscript{134}

In terms of the basic formulation for taxation, the carbon tax can be defined as the tax base (the energy source subject to the tax) multiplied by the tax rate (a certain sum of money per ton of carbon dioxide emitted), which provides us with the tax revenue.\textsuperscript{135} The carbon tax is directed towards taxpayers who conduct an\textsuperscript{136}

activity as set out in Annexure 1 to the Notices issued by the Minister responsible for environmental affairs in respect of the declaration of greenhouse gases as priority pollutants under section 29(1) read with section 57(1) of [NEMAQA].

Thus, polluters will be held liable for their fossil fuel combustion emissions, certain industrial processes, product use emissions, and fugitive

\begin{footnotesize}
\textsuperscript{131} Goitom 2015 http://www.loc.gov/law/foreign-news/article/south-africa-carbon-tax-legislation-proposed/.
\textsuperscript{132} Goitom 2015 http://www.loc.gov/law/foreign-news/article/south-africa-carbon-tax-legislation-proposed/.
\textsuperscript{133} Section 4 of the \textit{Carbon Tax Act} 15 of 2019 (the \textit{Carbon Tax Act}); Goitom 2015 http://www.loc.gov/law/foreign-news/article/south-africa-carbon-tax-legislation-proposed/; GRAIN and IATP 2018 https://www.grain.org/article/entries/5976-emissions-impossible-how-big-meat-and-dairy-are-heating-up-the-planet.
\textsuperscript{134} Section 4 of the \textit{Carbon Tax Act} provides that the carbon tax must be levied on a taxpayer with regard to greenhouse gas emissions resulting from "fuel combustion and industrial processes, and fugitive emissions". In terms of s 1 of the \textit{Carbon Tax Act}, an "industrial process" is defined as "a manufacturing process that chemically or physically transforms materials", and "fugitive emissions" are defined as "emissions that are released into the atmosphere by any other means than through an intentional release through stack or vent including extraction, processing, delivery and burning of for energy production of fossil fuels, including leaks from industrial plants and pipelines." Therefore, the carbon tax is levied on producers such as manufacturers, and industrial consumers; in Kotler and Armstrong "Consumer and Industrial Marketing" 35, "industrial consumers" are "customers who purchase in order to make or sell their own products or services."
\textsuperscript{135} Milne "Carbon Taxes in the United States" 4.
\textsuperscript{136} Section 3(b) of the \textit{Carbon Tax Act}.
\end{footnotesize}
However, emissions released from the human activities of "Agricultural and Other Land Use and waste sectors" are exempt from the carbon tax due to measurement difficulties.\footnote{138}

\subsection*{4.2.2 Legislative outlook}

Unlike our proposed meat tax (discussed below), the carbon tax is a "production tax". In the context of an environmentally related tax, a "production tax" is a tax according to the level of emission emitted by each producer individually (this corresponds with the definition of Scope 1 emissions).\footnote{139} The carbon tax thus has a potential indirect influence on the human behaviour of private consumers, through directly influencing producers.\footnote{140} This feature of the carbon tax means that there is no guarantee that private consumers will become aware of the link between environmental harm and the human activities resulting in greenhouse gas emissions, as private consumers are only indirectly affected by the carbon tax. The proposed meat tax, as a consumption tax, could be a more effective way of ensuring that private consumers become aware of such a link, as they would be directly affected.\footnote{141}

The carbon tax further disregards the majority of greenhouse gas emissions emanating from the meat production chain, as the activities of "Agricultural and Other Land Use and waste sectors" are exempt from the Carbon Tax Act.\footnote{137}

\footnote{137} Section 1 of the \textit{Carbon Tax Act}. 
\footnote{138} National Treasury 2018 http://www.treasury.gov.za/public%20comments/CarbonTaxBill2019/Explanatory%20Memorandum%20to%20the%20Carbon%20Tax%20Bill%20-%20Nov%202018.pdf 9; In Government of the RSA 2019 https://www.gov.za/speeches/publication-2019-carbon-tax-act-26-may-2019-0000, the carbon tax will be progressively implemented through two phases. The first phase is from 1 June 2019 to 31 December 2022, and the second phase will be from 2023 to 2030. The emissions released from the human activities of the "Agricultural and Other Land Use and waste sectors" will be exempt only in the first phase. 
\footnote{139} Masselus \textit{Tax on Meat} 21.
\footnote{138} National Treasury 2018 http://www.treasury.gov.za/public%20comments/CarbonTaxBill2019/Explanatory%20Memorandum%20to%20the%20Carbon%20Tax%20Bill%20-%20Nov%202018.pdf 9; Government of the RSA 2019 https://www.gov.za/speeches/publication-2019-carbon-tax-act-26-may-2019-0000; Fakoya 2014 \textit{Environmental Economics} 94.
\footnote{140} In Masselus \textit{Tax on Meat} 21-22, the following arguments are provided in support of a consumption tax on meat consumption: "the monitoring costs of greenhouse gas emissions are high for the meat sector. Measuring these emissions would require regular monitoring, which is very expensive; the options to reduce greenhouse gas emissions are limited; the possibilities to substitute meat are numerous. This would lead consumers to adapt their behaviour in a cost-effective way; and to avoid emission leakage. Assuming that the [production] tax is not implemented worldwide, the cost disadvantage that producers in the country or region of the emission tax would obtain, will simply lead to an increase in the import of meat products."
Therefore, the carbon tax does not cater for the greenhouse gas emissions resulting from the meat production sector, as Scope 3 emissions and the majority of the greenhouse gas arising from the human activity of meat production do not form part of the carbon tax. The proposed meat tax would focus on Scope 3 emissions, as they form the bulk of greenhouse gas emissions from a "given company or food product" in the meat production sector. This is the case as Scope 3 emissions take into consideration:

on-farm emissions from livestock, manure, farm machinery fuel, livestock feed production, production of the inputs needed to produce that feed, land-use changes triggered by the expansion of livestock grazing and feed production, and other sources.

Due to the limited and producer-focused nature of the carbon tax imposed by the Carbon Tax Act, we believe that a proposed meat tax should be implemented through a separate legislative instrument, rather than form part of the existing Carbon Tax Act. We further suggest that the proposed meat tax should follow a similar construction to that of sin taxes. Sin taxes are implemented through the Customs and Excise Act and levy a tax on particular products deemed to be harmful to society, such as alcoholic beverages and tobacco. The proposed meat tax could be similarly implemented through the Customs and Excise Act and levy a tax on particular meat products linked to the Scope 3 emissions arising therefrom. In addition, the proposed meat tax could be executed through its own regulations stemming from the Customs and Excise Act, which would address the quirks and key components of the proposed meat tax. The amount levied on each meat product could be calculated in terms of the

142 National Treasury 2018 http://www.treasury.gov.za/public%20comments/CarbonTaxBill2019/Explanatory%20Memorandum%20to%20the%20Carbon%20Tax%20Bill%20-%20Nov%202018.pdf; Government of the RSA 2019 https://www.gov.za/speeches/publication-2019-carbon-tax-act-26-may-2019-0000.
143 National Treasury 2018 http://www.treasury.gov.za/public%20comments/CarbonTaxBill2019/Explanatory%20Memorandum%20to%20the%20Carbon%20Tax%20Bill%20-%20Nov%202018.pdf; Government of the RSA 2019 https://www.gov.za/speeches/publication-2019-carbon-tax-act-26-may-2019-0000; Goitom 2015 http://www.loc.gov/law/foreign-news/article/south-africa-carbon-tax-legislation-proposed/; GRAIN and IATP 2018 https://www.grain.org/article/entries/5976-emissions-impossible-how-big-meat-and-dairy-are-heating-up-the-planet.
144 GRAIN and IATP 2018 https://www.grain.org/article/entries/5976-emissions-impossible-how-big-meat-and-dairy-are-heating-up-the-planet.
145 GRAIN and IATP 2018 https://www.grain.org/article/entries/5976-emissions-impossible-how-big-meat-and-dairy-are-heating-up-the-planet.
146 Kagan 2020 https://www.investopedia.com/terms/s/sin_tax.asp.
global warming potential and the climate change impacts of each meat product.\textsuperscript{147}

4.2.3 Objections to the meat tax

It might be argued that privileged consumers who can afford to pay more for meat products, once taxed, would be unmoved by a meat tax, and that their behaviour would not change. However, research by the Thai government indicates that "smoking prevalence among men declined from 44% in 2003 to 39% in 2006", primarily due to taxation.\textsuperscript{148} A further study based on 15 years of recent data illustrated that "a $0.25 increase in state excise tax is associated with a 0.6% decrease in population smoking prevalence."\textsuperscript{149} In addition, the implementation of the excise tax on alcoholic beverages serves as an example of the ability of a consumption tax to influence the behaviour of private consumers. The consumption of alcoholic beverages has decreased due to the increase in prices (a consequence of excise tax), and producers have reacted to the decrease in demand by producing more non-alcoholic beverages.\textsuperscript{150}

Similarly, the proposed meat tax could influence producers to seek more sustainable means of producing meat or producing plant-based meat-alternatives in order to better cater for the shift in demand.\textsuperscript{151} Producers may also be indirectly encouraged to create emission-reducing technology (reducing their socio-ecological impacts), rather than the cost-reducing technology promoted by command-and-control measures.\textsuperscript{152}

Sin taxes demonstrate the ability of taxes to influence consumer behaviour, even if not to change it entirely.\textsuperscript{153} In any event, even if a tax does not cause

\textsuperscript{147} One of the reasons why the carbon tax does not consider the greenhouse gases emitted from the agricultural sector is the difficulty of measurement (as the monitoring costs are too high and the agricultural activities resulting in greenhouse gas emission are extensive). However, in Dahlberg \textit{French Meat Tax? 4-5} the author argues that "a differentiated consumption tax based on [greenhouse gas] emission intensity per food unit is an effective policy to reduce [greenhouse gas] emission." This is the case, argued in Masselus \textit{Tax on Meat} 9, as it is easier to calculate the levied amount based on the global warming potential of each meat product than it is to monitor the greenhouse gas emission of the respective meat products produced by each factory farm.

\textsuperscript{148} White and Ross 2015 \textit{Health Economics} 131.
\textsuperscript{149} Sharbaugh \textit{et al} 2018 \textit{PLoS ONE} 9.
\textsuperscript{150} Stacey \textit{et al} 2017 \textit{BMJ Global Health}; Wills 2019 https://m.food24.com/Drinks/Beer/the-rise-of-non-alcoholic-beers-and-why-theyre-going-mainstream-20190625; Bird and Wallace \textit{Taxing Alcohol in Africa} 26.
\textsuperscript{151} Masselus \textit{Tax on Meat} 9.
\textsuperscript{152} Harrington 2007 \textit{Resources for the Future} 16.
\textsuperscript{153} Olivola and Sussman "Taxes and Consumer Behaviour" 568-569.
a drastic shift in consumer behaviour in the short term, it can at least, in combination with other regulatory measures, start a conversation about the socio-ecological impacts of meat production and consumption. Taxing consumers because of the harms caused by meat production and consumption could help to bring these harms to the fore.

A social justice objection to a meat tax could be that impoverished South Africans would be worst affected by the meat tax because the cost of their food would increase and they would no longer be able to afford meat, which is considered a vital source of protein. Our response to this objection is that measures must be put in place to ensure that the impacts of a meat tax do not adversely impact upon the poor, and to ensure a sustainable and equitable transition away from excessive and environmentally harmful meat production and consumption. For instance, we propose that meat produced by communal and subsistence farmers not be taxed. This is because, in order to fall under the scope of a factory farm, to which our proposed meat tax would apply, an "intensive animal feeding system" needs to be in operation on that particular farm, which would generally be an established commercial farm, due to the high costs and expensive machinery used to ensure the optimal usage of such a system. In contrast, the farming practices of communal/subsistence farmers, micro-scale farmers, small-scale farmers, and emerging farmers have relatively little impact on the environment. Their activities are ironically characterised, from a neo-liberal capitalist perspective, as inferior to the environmentally harmful farming practices of factory farms, because they supposedly involve:

simple, outdated technologies, [with] low returns, high seasonal labour fluctuations and women playing a vital role in production.

Accordingly, meat produced by subsistence/communal farmers, micro-scale farmers, small-scale farmers, and emerging farmers (participating in the meat production industry) could fall outside of the scope of the proposed

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154 Chadd, Davies and Koivisto "Practical Production of Protein for Food Animals" 84.
155 See Vinnari and Vinnari 2014 J Agric Environ Ethics 375-391.
156 Section 1(b) of the Health Act; Grobler Regulating the Environmental Impacts of Factory Farming 2.
157 Erasmus and Hoffman 2017 Animal Frontiers 72 demonstrate that rural communities have "limited access to meat" and thus meat is consumed for perceived human survival, not for the purposes of mere indulgence.
158 Department of Agriculture, Forestry and Fisheries 2012 https://www.nda.agric.za/doaDev/sideMenu/cooperativeandenterprisedevelopment/docs/FRAMEWORK-%20OF%20SMALL%20FARMERS%20(2).pdf 1 in Tihanyi and Robinson "Setting the Scene" 3. We refer to Figure 1, which shows the varying kinds of farmers in terms of their development stage.
meat tax, as it does not originate in a factory farm and would thus have far fewer impacts on the environment than meat produced on factory farms.\textsuperscript{159} There are approximately 3 million communal farmers, who account for 40% of the total cattle available in South Africa.\textsuperscript{160} Most meat products purchased in rural communities are from the "informal market" (which is dominated by communal farmers, micro-scale farmers, small-scale farmers, and emerging farmers).\textsuperscript{161} Therefore, if the application of the meat tax were limited to factory farms, the diets of rural communities would be largely unaffected, as most meat products purchased in rural communities are not from factory farms and thus are produced in less environmentally harmful settings. Another way of ensuring an equitable and sustainable transition from excessive and environmentally harmful meat production and consumption would be to introduce subsidies for plant-based alternatives to meat products to ensure that all people are able to enjoy an affordable, balanced diet.\textsuperscript{162}

5 Conclusion

This article has argued that the regulation of the human behaviour of meat consumption through the enactment of a proposed meat tax could mitigate the socio-ecological harms caused by the human activity of meat production. In order to prove this, in Section 2 we examined some of the links between socio-ecological harm and the human activity of meat production. We further argued that the human activity of meat production (and consequently its harms) is driven by the human behaviour of meat consumption. In Section 3 we set out a number of the key command-and-control measures that are in place to regulate the harms caused by meat production. However, due to the shortcomings of the command-and-control measures, we argued that they are not sufficient to fulfil the environmental right, and fail to secure ecologically sustainable development. In particular, the command-and-control method of regulating the harms caused by meat production does not regulate consumption, the primary reason for meat production, and consequently facilitates its existence.\textsuperscript{163} Further, the permit system in place merely manages environmental degradation by setting thresholds, thus legally permitting an environmentally destructive activity to take place within the boundaries of the set thresholds.\textsuperscript{164}

\textsuperscript{159} Tihanyi and Robinson "Setting the Scene" 3.
\textsuperscript{160} Sotsha \textit{et al} 2018 \textit{OIDA IJSD} 73.
\textsuperscript{161} Erasmus and Hoffman 2017 \textit{Animal Frontiers} 72.
\textsuperscript{162} Vinnari and Vinnari 2014 \textit{J Agric Environ Ethics} 385.
\textsuperscript{163} Salzman 2013 \textit{Duke Envtl L & Pol'y F} 365.
\textsuperscript{164} Wilson 2005 \textit{Fordham Envtl L Rev} 234-235.
through our analysis of the recently introduced carbon tax, we offered a theoretical understanding of the proposed meat tax and further provided guidelines as to how the proposed meat tax could be introduced in South Africa. We suggested that the proposed meat tax be a consumption tax in order that it might induce consumers to become more conscious of the links amongst meat consumption, socio-ecological harm and meat production.165 We further suggested that the proposed meat tax could be implemented through regulations (which would address the unique features of the proposed meat tax) stemming from the Customs and Excise Act.

We reiterate that the proposed meat tax envisages regulatory reform by the South African government in response to climate change and other socio-ecological issues, but is by no means to be viewed as a panacea for the problematic human behaviour and human activities related to and arising from the meat industry. A meat tax could be introduced alongside various policy and other measures such as subsidies and marketing and educational campaigns.166 Nonetheless, we maintain that the proposed meat tax offers an innovative means to regulate meat consumption in South Africa because it would be a new tool in response to a modern issue.167 The proposed tax seeks to respond to the socio-ecological harms arising from meat production that are compounding the global climate crisis. Among other things, the proposed tax seeks to influence human behaviour and the psychological patterns giving rise thereto by facilitating an increased consciousness of the harms arising from the human activity of meat production. We realise that the introduction of a meat tax would among other reactions face severe cultural and political resistance. Nonetheless, if we are serious about responding to the climate crisis and its dire socio-ecological consequences, we need to be innovative and imaginative in our regulatory responses, as a business-as-usual approach will have significant implications for the destruction of the Earth and all of its systems, and thus for human survival.

165 Masselus Tax on Meat 8-9.
166 Vinnari and Vinnari 2014 J Agric Environ Ethics 383-385.
167 In OECD 1996 https://www.oecd.org/sti/inno/2102514.pdf 7 the authors state that "[r]egulation directly affects the innovative process, while innovation and technical change have significant impacts on regulation."
Bibliography

Literature

Anomaly 2015 *Public Health Ethics*
Anomaly J "What's Wrong with Factory Farming?" 2015 *Public Health Ethics* 246-254

Ashukem 2017 *LEAD Journal*
Ashukem JN "Setting the Scene for Climate Change Litigation in South Africa: *Earthlife Africa Johannesburg* v Minister of Environmental Affairs and Others [2017] ZAGPPHC 58 (2017) 65662/16" 2017 *LEAD Journal* 37-43

Bahr 2015 *TEL*
Bahr CC "Greenhouse Gas Taxes on Meat Products: A Legal Perspective" 2015 *TEL* 153-179

Bailey, Froggatt and Wellesley *Livestock*
Bailey R, Froggatt A and Wellesley L *Livestock – Climate Change's Forgotten Sector: Global Public Opinion on Meat and Dairy Consumption (Research Paper)* (Chatham House London 2014)

Bilchitz 2012 *SAPL*
Bilchitz D "When is Animal Suffering Necessary?" 2012 *SAPL* 1-29

Bird and Wallace *Taxing Alcohol in Africa*
Bird RM and Wallace S *Taxing Alcohol in Africa: Reflections from International Experience (ITP Paper 0304)* (International Tax Program Toronto 2003)

Bosselmann "Ever-increasing Importance of Ecological Integrity"
Bosselmann K "The Ever-increasing Importance of Ecological Integrity in International and National Law" in Westra L et al (eds) *Ecological Integrity, Law and Governance* (Routledge New York 2018) 225-233

Botai, Botai and Adeola 2018 *S Afr J Sci*
Botai CM, Botai JO and Adeola AM "Spatial Distribution of Temporal Precipitation Contrasts in South Africa" 2018 *S Afr J Sci* 70-78

Brauer *et al Use of Market Incentives to Preserve Biodiversity*
Brauer I *et al The Use of Market Incentives to Preserve Biodiversity: Final Report* (Ecologic Berlin 2006)
Briassoulis 2019 *Land*
Briassoulis H "Combating Land Degradation and Desertification: The Land-use Planning Quandary" 2019 *Land* 1-26

Briggs *et al* 2016 *BMC Public Health*
Briggs ADM *et al* "Simulating the Impact on Health of Internalising the Cost of Carbon in Food Prices Combined with a Tax on Sugar-sweetened Beverages" 2018 *BMC Public Health* 1-14

Carruthers 2016 *Fordham L Rev*
Carruthers BG "The Semantics of Sin Tax: Politics, Morality, and Fiscal Imposition" 2016 *Fordham L Rev* 2565-2582

Centemeri 2009 *e-cadernos CES*
Centemeri L "Environmental Damage as Negative Externality: Uncertainty, Moral Complexity and the Limits of the Market" 2009 *e-cadernos CES* 21-40

Chadd, Davies and Koivisto "Practical Production of Protein for Food Animals"
Chadd SA, Davies PW and Koivisto JM "Practical Production of Protein for Food Animals" in FAO *Protein Sources for the Animal Feed Industry* (FAO Rome 2004) 77-123

Chang *et al* 2018 *Hydrol Earth Syst Sci*
Chang S *et al* "Evaluation of Impacts of Future Climate Change and Water Use Scenarios on Regional Hydrology" 2018 *Hydrol Earth Syst Sci* 4793-4813

Colvin *et al* *Water*
Colvin C *et al Water: Facts and Futures - Rethinking South Africa’s Water Future (Report)* (World Wildlife Fund-South Africa Cape Town 2016)

Craigie, Snijman and Fourie "Dissecting Environmental Compliance"
Craigie F, Snijman P and Fourie M "Dissecting Environmental Compliance and Enforcement in South Africa: Legal Perspectives" in Paterson A and Kotzé L (eds) *Environmental Compliance and Enforcement in South Africa – Legal Perspectives* (Juta Cape Town 2009) ch 3

Craigie, Snijman and Fourie "Environmental Compliance and Enforcement Institutions"
Craigie F, Snijman P and Fourie M "Environmental Compliance and Enforcement Institutions" in Paterson A and Kotzé L (eds) *Environmental
Compliance and Enforcement in South Africa – Legal Perspectives (Juta Cape Town 2009) ch 4

Curran and Hollander 2015 Australas J Environ Manag
Curran G and Hollander R "25 Years of Ecologically Sustainable Development in Australia: Paradigm Shift or Business as Usual?" 2015 Australas J Environ Manag 2-6

Dahlberg French Meat Tax
Dahlberg S A French Meat Tax – An Effective Climate Mitigation Policy? (Environmental Economics and Management Master's dissertation Swedish University of Agricultural Sciences 2017)

De Baker and Dagevos 2012 J Agric Environ Ethics
De Baker E and Dagevos H "Reducing Meat Consumption in Today's Consumer Society: Questioning the Citizen-consumer Gap" 2012 J Agric Environ Ethics 877-894

Elazegui 2002 Policy Brief
Elazegui DD "A Law of Nature – The Command-and-control Approach" 2002 Policy Brief 1-2

Erasmus and Hoffman 2017 Animal Frontiers
Erasmus SW and Hoffman LC "What is Meat in South Africa?" 2017 Animal Frontiers 71-75

Fakoya 2014 Environmental Economics
Fakoya MB "Carbon Tax Policy Implications for Economic Growth and Unemployment Rates in South Africa: A Conceptual Thought" 2014 Environmental Economics 93-98

FAO State of Food and Agriculture
Food and Agriculture Organization of the United Nations The State of Food and Agriculture: Livestock in the Balance (Food and Agriculture Organization of the United Nations Rome 2009)

FAO Tackling Climate Change through Livestock
Food and Agriculture Organization of the United Nations Tackling Climate Change through Livestock: A Global Assessment of Emissions and Mitigation Opportunities (Food and Agriculture Organization of the United Nations Rome 2013)
Feris 2006 *PELJ*
Feris LA "Compliance Notices – A New Tool in Environmental Enforcement" 2006 *PELJ* 1-18

Feris 2008 *CCR*
Feris L "Sustainable Development in Practice: Fuel Retailers Association of Southern Africa v Director-General Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province" 2008 *CCR* 235-253

Fourie 2009 *SAJELP*
Fourie M "How Civil and Administrative Penalties can Change the Face of Environmental Compliance in South Africa" 2009 *SAJELP* 1-25

Fresán and Sabaté 2019 *Advances in Nutrition*
Fresán U and Sebaté J "Vegetarian Diets: Planetary Health and its Alignment with Human Health" 2019 *Advances in Nutrition* S380-S388

Grobler Regulating the Environmental Impacts of Factory Farming
Grobler R Regulating the Environmental Impacts of Factory Farming in South Africa: Legal Perspectives (LLM-dissertation North West University 2012)

Grossi *et al* 2019 *Animal Frontiers*
Grossi G *et al* "Livestock and Climate Change: Impact of Livestock on Climate and Mitigation Strategies" 2019 *Animal Frontiers* 69-76

Happer and Wellesley 2019 *Food Security*
Happer C and Wellesley L "Meat Consumption, Behaviour and the Media Environment: A Focus Group Analysis across Four Countries" 2019 *Food Security* 123-139

Harrington 2007 *Resources for the Future*
Harrington W "Economic Incentives Versus Command and Control: What's the Best Approach for Solving Environmental Problem?" 2007 *Resources for the Future* 13-17

Holdershaw and Gendall "Understanding and Predicting Human Behaviour"
Holdershaw J and Gendall PE "Understanding and Predicting Human Behaviour" Unpublished contribution delivered at the ANZCA08 *Power and Place Conference* (July 2008 Wellington) 1-15
Hornby *Oxford Advanced Learner's Dictionary*
Hornby AS *Oxford Advanced Learner's Dictionary of Current English* 8th ed (Oxford University Press Oxford 2010)

Hugo *Administrative Penalties*
Hugo RE *Administrative Penalties as a Tool for Resolving South Africa’s Environmental Compliance and Enforcement Woes* (LLM-dissertation University of Cape Town 2014)

Humby 2018 *JEL*
Humby T “The Thabametsi Case: Case No 65662/16 *Earthlife Africa Johannesburg v Minister of Environmental Affairs*” 2018 JEL 145-155

IPCC *Climate Change 2014*
Intergovernmental Panel on Climate Change *Climate Change 2014: Impacts, Adaptation, and Vulnerability: Summaries, Frequently Asked Questions, and Cross-Chapter Boxes: A Working Group II Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press Cambridge 2015)

IPCC *Global Warming of 1.5°C*
Intergovernmental Panel on Climate Change *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty* (IPCC Geneva 2018)

Johnson 1999 *Wash & Lee L Rev*
Johnson SM "Economics v Equity: Do Market-based Environmental Reforms Exacerbate Environmental Injustice" 1999 *Wash & Lee L Rev* 111-166

Junquera and Del Brio 2016 *Sustainability*
Junquera B and Del Brio JA "Preventative Command and Control Regulation: A Case Analysis" 2016 *Sustainability* 1-17

Kaka *Corporate Self-regulation*
Kaka I *Corporate Self-regulation and Environmental Protection* (LLM-dissertation North West University 2012)
Khan 2015 *Laws*
Khan MR "Polluter-pays-principle: The Cardinal Instrument for Addressing Climate Change" 2015 *Laws* 638-653

Kidd "Criminal Measures"
Kidd M "Criminal Measures" in Paterson A and Kotzé L (eds) *Environmental Compliance and Enforcement in South Africa – Legal Perspectives* (Juta Cape Town 2009) ch 10

Kidd *Environmental Law*
Kidd M *Environmental Law* 2nd ed (Juta Cape Town 2011)

Kohn 2012 *SAJELP*
Kohn L "The Anomaly that is Section 24G of NEMA: An Impediment to Sustainable Development" 2012 *SAJELP* 1-28

Kotler and Armstrong "Consumer and Industrial Marketing"
Kotler P and Armstrong G "Consumer and Industrial Marketing" in Kotler P and Armstrong G *Principles of Marketing* 10th ed (Prentice Hall Upper Saddle River 2004) ch 4

Kotzé 2014 *JERL*
Kotzé LJ "Rethinking Global Environmental Law and Governance in the Anthropocene" 2014 *JERL* 121-156

Kurz et al 2015 *Wiley Interdiscip Rev Clim Change*
Kurz T et al "Habitual Behaviors or Patterns of Practice? Explaining and Changing Repetitive Climate-relevant Actions" 2015 *Wiley Interdiscip Rev Clim Change* 113-128

Labuschagne, Louw and Ndanga "Consumer-orientated Study of the South African Beef Value Chain"
Labuschagne A, Louw A and Ndanga L "A Consumer-orientated Study of the South African Beef Value Chain" Unpublished contribution delivered at the *Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference* (19-23 September 2010 Cape Town)

Liverani *Climate Change and Individual Behavior*
Liverani A *Climate Change and Individual Behavior: Considerations for Policy* (World Bank Washington DC 2010)
Lorenzi 2004 *Social Science and Public Policy*
Lorenzi P "Sin Taxes" 2004 *Social Science and Public Policy* 59-65

Manning, Reisinger and Bodeker *Global Warming Potentials*
Manning M, Reisinger A, and Bodeker G *Global Warming Potentials and Alternate Metrics* (New Zealand Climate Change Research Institute Wellington 2009)

Masselus *Tax on Meat*
Masselus L A *Tax on Meat as a Climate Policy Measure* (Masters of Science dissertation Ghent University 2016)

Meissner, Scholtz and Engelbrecht 2013 *S Afr J Anim Sci*
Meissner HH, Scholtz MM and Engelbrecht FA "Sustainability of the South African Livestock Sector towards 2050 Part 1: Worth and Impact of the Sector" 2013 *S Afr J Anim Sci* 282-297

Miller, Amit and Posten "Behavioral Economics"
Miller JE, Amit E and Posten A "Behavioral Economics" in *Encyclopedia of Global Bioethics* (Springer International Cham 2016) 1-6

Milne "Carbon Taxes in the United States"
Milne JE "Carbon Taxes in the United States: The Context for the Future" in Milne JE (ed) *The Reality of Carbon Taxes in the 21st Century* (Western Newspaper Publishing Indianapolis 2008) ch 1

Murcott 2015 *SALJ*
Murcott M "The Role of Environmental Justice in Socio-economic Rights Litigation" 2015 *SALJ* 875-908

Murcott "Introducing Transformative Constitutionalism"
Murcott M "Introducing Transformative Constitutionalism in South Africa" in Daly E et al (eds) *New Frontiers in Environmental Constitutionalism* (UNEP Nairobi 2017) 280-294

Njisane and Muchenje 2017 *AJAS*
Njisane YZ and Muchenje V "Farm to Abattoir Conditions, Animal Factors and their Subsequent Effects on Cattle Behavioural Responses and Beef Quality – A Review" 2017 *AJAS* 755-764

OECD "Fundamental Principle of Taxation"
Organisation for Economic Co-operation and Development "Fundamental Principle of Taxation" in Organisation for Economic Co-operation and
Development *Addressing the Tax Challenges of the Digital Economy* (OECD Paris 2014) 29-49

Olivola and Sussman "Taxes and Consumer Behaviour"
Olivola C and Sussman AB "Taxes and Consumer Behaviour" in Norton MI (eds) *The Cambridge Handbook of Consumer Psychology* (Cambridge University Press Cambridge 2015) 564-588

Peel and Osofsky 2018 *TEL*
Peel J and Osofsky H "A Rights Turn in Climate Change Litigation" 2018 *TEL* 27-67

Petrovic et al 2015 *Procedia Food Science*
Petrovic Z et al "Meat Production and Consumption: Environmental Consequences" 2015 *Procedia Food Science* 235-238

Poore and Nemecek 2019 *Science 360*
Poore J and Nemecek T "Reducing Food's Environmental Impacts through Producers and Consumers" 2019 *Science 360* 1-6

Puryear, Bruers and Erdös 2017 *J Agric Environ Ethics*
Puryear S, Bruers S and Erdös L "On a Failed Defense of Factory Farming" 2017 *J Agric Environ Ethics* 311-323

Salzman 2013 *Duke Envtl L & Pol'y F*
Salzman J "Teaching Policy Instrument Choice in Environmental Law: The Five P's" 2013 *Duke Envtl L & Pol'y F* 363-376

Sharbaugh et al 2018 *PLoS ONE*
Sharbaugh MS et al "Impact of Cigarette Taxes on Smoking Prevalence from 2001-2015: A Report Using the Behavioral and Risk Factor Surveillance Survey" 2018 *PLoS ONE* 1-10

Sotsha et al 2018 *OIDA IJSD*
Sotsha K et al "Factors Influencing Communal Livestock Farmers' Participation into the National Red Meat Development Programme (NRMDP) in South Africa: The Case of the Eastern Cape Province" 2018 *OIDA IJSD* 73-80

Stacey et al 2017 *BMJ Global Health*
Stacey N et al "Simulating the Impact of Excise Taxation for Disease Prevention in Low-income and Middle-income Countries: An Application to South Africa" 2017 *BMJ Global Health* 1-6
Statistics South Africa *Mid-year Population Estimates*
Statistics South Africa *Mid-year Population Estimates* (Statistics South Africa Pretoria 2018)

Stavins *Market-based Environmental Policies*
Stavins RN *Market-based Environmental Policies: What Can We Learn from U.S. Experience (and Related Research)?* (John F Kennedy School of Government, Harvard University Cambridge 2003)

Springmann *et al* 2018 *PLoS ONE*
Springmann M *et al* "Health-motivated Taxes on Red and Processed Meat: A Modelling Study on Optimal Tax Levels and Associated Health Impacts" 2018 *PLoS ONE* 1-16

Summers "Common-law Remedies for Environmental Protection"
Summers M "Common-law Remedies for Environmental Protection" in Paterson A and Kotzé L (eds) *Environmental Compliance and Enforcement in South Africa – Legal Perspectives* (Juta Cape Town 2009) ch 13

Swim, Clayton and Howard 2011 *Am Psychol*
Swim JK, Clayton S and Howard GS "Human Behavioural Contributions to Climate Change: Psychological and Contextual Drivers" 2011 *Am Psychol* 251-264

Tihanyi and Robinson "Setting the Scene"
Tihanyi K and Robinson K "Setting the Scene" in Mabaya E *et al* (eds) *Case Studies of Emerging Farmers and Agribusinesses in South Africa* (Sun Press Stellenbosch 2011) ch 1

Tuomisto and Teixeira de Mattos 2011 *Environ Sci Technol*
Tuomisto HL and Teixeira de Mattos MJ "Environmental Impacts of Cultured Meat Production" 2011 *Environ Sci Technol* 6117-6123

Turner *Factory Farming and the Environment*
Turner J *Factory Farming and the Environment: A Report for Compassion in World Farming Trust* (Compassion in World Farming Trust Petersfield 1999)

Van Wyngaard, Meeske and Erasmus 2017 *Elsenburg Journal*
Van Wyngaard J, Meeske R and Erasmus L "Is Carbon Tax a Reality for Dairy Farmers?" 2017 *Elsenburg Journal* 51-55
Vandrovcova "Psychology of Meat Consumption"
Vandrovcova T "The Psychology of Meat Consumption" in Sedova I (eds) *Handbook of Research on Social Marketing and It's Influence on Animal Origin Food Product Consumption* (IGI Global Hershey 2018) 1-16

Vinnari and Vinnari 2014 *J Agric Environ Ethics*
Vinnari M and Vinnari E "A Framework for Sustainability: The Case of Plant-based Diets" 2014 *J Agric Environ Ethics* 369-396

Vlek and Steg 2007 *JSI*
Vlek C and Steg L "Human Behavior and Environmental Sustainability: Problems, Driving Forces, and Research Topics" 2007 *JSI* 1-19

Vumbhoni *Critical Analysis of the Law on Duty of Care to the Environment*
Vumbhoni C *Critical Analysis of the Law on Duty of Care to the Environment in South Africa: Challenges and Prospects* (LLM-dissertation University of Limpopo 2017)

Washington et al 2017 *Ecological Citizen*
Washington H et al "Why Ecocentrism is the Key Path to Sustainability" 2017 *The Ecological Citizen* Y-Z

White and Ross 2015 *Health Economics*
White JS and Ross H "Smokers' Strategic Responses to Sin Taxes: Evidence from Panel Data in Thailand" 2015 *Health Economics* 127-141

Wilson 2005 *Fordham Envtl L Rev*
Wilson MW "A Behavioral Critique of Command-and-control Environmental Regulation" 2005 *Fordham Envtl L Rev* 223-259

Wilson 2019 *Forum of Animal Law Studies*
Wilson AP "Animal Law in South Africa: 'Until the Lions have their Own Lawyers, the Law will Continue to Protect the Hunter’" 2019 *Forum of Animal Law Studies* 35-58

Winstanley "Administrative Measures"
Winstanley T "Administrative Measures" in Paterson A and Kotzé L (eds) *Environmental Compliance and Enforcement in South Africa – Legal Perspectives* (Juta Cape Town 2009) ch 9

WWF *Climate Change on Your Plate*
World Wildlife Fund *Climate Change on Your Plate* (World Wildlife Fund Berlin 2012)
Zhang 2013 *CJPRE*
Zhang B "Market-based Solutions: An Appropriate Approach to Resolve Environmental Problems" 2013 *CJPRE* 87-91

**Case law**

*Earthlife Africa Johannesburg v Minister of Environmental Affairs* [2017] 2 All SA 519 (GP)

*Fuel Retailers Association of Southern Africa v Director General: Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province* 2007 6 SA 4 (CC)

**Legislation**

*Agricultural Product Standards Act* 119 of 1990

*Carbon Tax Act* 15 of 2019

*Conservation of Agricultural Resources Act* 43 of 1983

*Constitution of the Republic of South Africa*, 1996

*Customs and Excise Act* 91 of 1964

*Health Act* 63 of 1977

*Meat Safety Act* 40 of 2000

*National Environmental Management Act* 107 of 1998

*National Environmental Management: Air Quality Act* 39 of 2004

*National Environmental Management Amendment Act* 20 of 2014

*National Environmental Management: Waste Act* 59 of 2008

*National Water Act* 36 of 1998

**Other government publications**

*Environmental Impact Assessment Regulations, 2014* (GN R982 in GG 38282 of 4 December 2014)

*Environmental Impact Assessment Regulations Listing Notice 1, 2014* (GN R983 in GG 38282 of 4 December 2014)
Listed Activities and Associated Minimum Emission Standards Identified in terms of section 21 of the National Environmental Management: Air Quality Act, 2004, 2013 (GN 893 in GG 37054 of 22 November 2013)

National Climate Change Response White Paper, 2011 (GN 757 in GG 34695 of 19 October 2011)

Regulations Regarding the Classification and Marketing of Meat Intended for Sale in the Republic of South Africa, 2006 (GN 863 in GG 29155 of 1 September 2006)

International instruments

United Nations Framework Convention on Climate Change (1992)

United Nations Convention to Combat Desertification (1994)

Kyoto Protocol to the United Nations Framework Convention on Climate Change (1998)

Paris Agreement (2015)

Internet sources

Cornelius 2017 http://www.redmeatsa.co.za/wp-content/uploads/2017/03/AMT-Beef-Outlook-February-2017.pdf
Cornelius P 2017 AMT Beef Outlook/Review - February 2017 http://www.redmeatsa.co.za/wp-content/uploads/2017/03/AMT-Beef-Outlook-February-2017.pdf accessed 7 July 2019

Department of Agriculture, Forestry and Fisheries 2012 https://www.nda.agric.za/doaDev/sideMenu/cooperativeandenterprisedevelopment/docs/FRAMEWORK-%20OF%20SMALL%20FARMERS%20(2).pdf
Department of Agriculture, Forestry and Fisheries 2012 A Framework for the Development of Smallholder Farmers through Cooperative Development https://www.nda.agric.za/doaDev/sideMenu/cooperativeandenterprisedevelopment/docs/FRAMEWORK-%20OF%20SMALL%20FARMERS%20(2).pdf accessed 22 January 2021

Department of Agriculture, Forestry and Fisheries 2017 http://webapps.daff.gov.za/AmisAdmin/upload/South%20African%20Animal%20Feeds%20Market%20Analysis%20Report%202017.pdf
Department of Agriculture, Forestry and Fisheries 2017 *South African Animal Feeds Market Analysis Report* http://webapps.daff.gov.za/Amis Admin/upload/South%20African%20Animal%20Feeds%20Market%20Analysis%20Report%202017.pdf accessed 27 January 2021

Department of Water and Sanitation Date Unknown https://www.dws.gov.za/IO/Docs/CMA/CMA%20GB%20Training%20Manuals/gbtrainingmanualchapter1.pdf

Department of Water and Sanitation Date Unknown *Chapter 1: Overview of the South African Water Sector* https://www.dws.gov.za/IO/Docs/CMA/CMA%20GB%20Training%20Manuals/gbtrainingmanualchapter1.pdf accessed 15 January 2018

FAO 2016 http://www.fao.org/3/a-i6340e.pdf
Food and Agriculture Organisation of the United Nations 2016 *Greenhouse Gas Emissions from Agriculture, Forestry and Other Land Use* http://www.fao.org/3/a-i6340e.pdf accessed 22 January 2021

FAO 2017 http://www.fao.org/3/i8098EN/i8098en.pdf
Food and Agriculture Organisation of the United Nations 2017 *Livestock Solutions for Climate Change* http://www.fao.org/3/i8098EN/i8098en.pdf accessed 22 January 2021

FAO 2018 http://www.fao.org/3/i8384en/i8384EN.pdf
Food and Agriculture Organisation of the United Nations 2018 *Shaping the Future of Livestock: Sustainably, Responsibly, Efficiently* http://www.fao.org/3/i8384en/i8384EN.pdf accessed 22 January 2021

FAIRR 2016 https://cdn.fairr.org/2019/01/09115647/FAIRR_Report_Factory_Farming_Assessing_Investment_Risks.pdf
Farm Animal Investment Risk and Return 2016 *Factory Farming: Assessing Investment Risks* https://cdn.fairr.org/2019/01/09115647/FAIRR_Report_Factory_Farming_Assessing_Investment_Risks.pdf accessed 13 June 2020

FAIRR 2017 https://cdn.fairr.org/2019/01/09120314/meat-tax-probable_final.docx
Farm Animal Investment Risk and Return 2017 *Climate Tax on Meat Becoming ‘Increasingly Probable’* https://cdn.fairr.org/2019/01/09120314/meat-tax-probable_final.docx accessed 7 July 2019
Goitom 2015 http://www.loc.gov/law/foreign-news/article/south-africa-carbon-tax-legislation-proposed/
Goitom H 2015 *South Africa: Carbon-tax Legislation Proposed* http://www.loc.gov/law/foreign-news/article/south-africa-carbon-tax-legislation-proposed/ accessed 4 December 2018

Goldblatt 2010 http://awsassets.wwf.org.za/downloads/facts_brochure_mockup_04_b.pdf
Goldblatt A 2010 *Agriculture: Facts and Trends: South Africa* http://awsassets.wwf.org.za/downloads/facts_brochure_mockup_04_b.pdf accessed 22 January 2021

Goodland and Anhang 2009 https://awellfedworld.org/wp-content/uploads/Livestock-Climate-Change-Anhang-Goodland.pdf
Goodland R and Anhang J 2009 *Livestock and Climate Change: What if the Key Actors in Climate Change are… Cows, Pigs, and Chickens* https://awellfedworld.org/wp-content/uploads/Livestock-Climate-Change-Anhang-Goodland.pdf accessed 22 January 2021

Gous 2018 https://www.timeslive.co.za/news/south-africa/2018-12-10-south-africans-love-meat-but-how-do-we-stack-up-globally/
Gous N 2018 *South Africans Love Meat, but How Do We Stack Up Globally?* https://www.timeslive.co.za/news/south-africa/2018-12-10-south-africans-love-meat-but-how-do-we-stack-up-globally/ accessed 26 June 2019

Government of the RSA 2019 https://www.gov.za/speeches/publication-2019-carbon-tax-act-26-may-2019-0000
Government of the Republic of South Africa 2019 *President Cyril Ramaphosa Signs 2019 Carbon Tax Act into Law* https://www.gov.za/speeches/publication-2019-carbon-tax-act-26-may-2019-0000 accessed 30 June 2019

GRAIN and IATP 2018 https://www.grain.org/article/entries/5976-emissions-impossible-how-big-meat-and-dairy-are-heating-up-the-planet
GRAIN and the Institute for Agriculture and Trade Policy 2018 *Emissions Impossible: How Big Meat and Dairy are Heating Up the Planet* https://www.grain.org/article/entries/5976-emissions-impossible-how-big-meat-and-dairy-are-heating-up-the-planet accessed 22 January 2021
IPCC 2018 https://www.ipcc.ch/site/assets/uploads/2019/08/2f.-Chapter-5_FINAL.pdf
Intergovernmental Panel on Climate Change 2018 Chapter 5: Food Security
https://www.ipcc.ch/site/assets/uploads/2019/08/2f.-Chapter-5_FINAL.pdf
accessed 14 June 2020

Kagan 2020 https://www.investopedia.com/terms/s/sin_tax.asp
Kagan J 2020 Sin Tax https://www.investopedia.com/terms/s/sin_tax.asp
accessed 22 January 2021

Khan Academy Date Unknown https://www.khanacademy.org/economics-finance-domain/microeconomics/consumer-producer-surplus/environmental-regulation/a/command-and-control-regulation-cnx
Khan Academy Date Unknown Command-and-control Regulation
https://www.khanacademy.org/economics-finance-domain/microeconomics/consumer-producer-surplus/environmental-regulation/a/command-and-control-regulation-cnx
accessed 30 January 2018

Krishnamoorthy Date Unknown https://www.academia.edu/901450/ENVIRONMENTAL_GOVERNANCE-SHIFT_FROM_COMMAND_AND_CONTROL_MECHANISM_TO_MARKET_DRI

Krishnamoorthy B Date Unknown Environmental Governance - Shift from Command and Control Mechanism to Market Driven Strategies
https://www.academia.edu/901450/ENVIRONMENTAL_GOVERNANCE-SHIFT_FROM_COMMAND_AND_CONTROL_MECHANISM_TO_MARKET_DRI
accessed 20 June 2019

Miller and Vela 2013 https://www.cbd.int/financial/mainstream/idb-tax.pdf
Miller SJ and Vela MA 2013 Are Environmentally Related Taxes Effective?
https://www.cbd.int/financial/mainstream/idb-tax.pdf accessed 22 January 2021

Moolla, McNamara and Nicholis 2014 https://www.nbi.org.za/wp-content/uploads/2016/06/NBI-Connecting-IPCC-Guidelines-with-Corporate-Standard-April-2015-final-report.pdf
Moolla Z, McNamara A and Nicholis S 2014 Connecting the IPCC Greenhouse Gas Inventory Guidelines with the Corporate Standard (Discussion Draft) https://www.nbi.org.za/wp-content/uploads/2016/06/NBI-Connecting-IPCC-Guidelines-with-Corporate-Standard-April-2015-final-report.pdf accessed 22 January 2021
National Treasury 2018 http://www.treasury.gov.za/public%20comments/CarbonTaxBill2019/Explanatory%20Memorandum%20to%20the%202018%20Carbon%20Tax%20Bill%20-%2020Nov%202018.pdf
National Treasury 2018 *Explanatory Memorandum on the Carbon Tax Bill, 2018* http://www.treasury.gov.za/public%20comments/CarbonTaxBill2019/Explanatory%20Memorandum%20to%20the%202018%20Carbon%20Tax%20Bill%20-%2020Nov%202018.pdf accessed 22 January 2021

OCE 2018 https://www.ipcc.ch/site/assets/uploads/sites/2/2019/03/ST1.5_final_310119.pdf
Office for Climate Education 2018 *IPCC Special Report: Global Warming of 1.5°C - Summary for Teachers* https://www.ipcc.ch/site/assets/uploads/sites/2/2019/03/ST1.5_final_310119.pdf accessed 22 January 2021

OECD 1996 https://www.oecd.org/sti/inno/2102514.pdf
Organisation for Economic Co-operation and Development 1996 *Regulatory Reform and Innovation* https://www.oecd.org/sti/inno/2102514.pdf accessed 24 July 2019

OECD 2006 https://read.oecd-ilibrary.org/environment/the-political-economy-of-environmentally-related-taxes_9789264025530-en#
Organisation for Economic Co-operation and Development 2006 *The Political Economy of Environmentally Related Taxes* https://read.oecd-ilibrary.org/environment/the-political-economy-of-environmentally-related-taxes_9789264025530-en# accessed 25 June 2019

Ritchie and Roser 2017 https://ourworldindata.org/meat-and-seafood-production-consumption
Ritchie H and Roser M 2017 *Meat and Dairy Production* https://ourworldindata.org/meat-and-seafood-production-consumption accessed 19 May 2019

Sahney Date Unknown http://www.nptel.ac.in/courses/110105029/pdf%20sahany/Module-1-1.pdf
Sahney S Date Unknown *Module 1: Introduction to the Study of Consumer Behavior*
http://www.nptel.ac.in/courses/110105029/pdf%20sahany/Module-1-1.pdf accessed 30 June 2018
Stockholm Resilience Centre 2015 https://www.stockholmresilience.org/research/research-news/2015-02-19-what-is-resilience.html
Stockholm Resilience Centre 2015 *What is Resilience?* https://www.stockholmresilience.org/research/research-news/2015-02-19-what-is-resilience.html accessed 16 May 2019

UN Date Unknown https://www.un.org/en/sections/issues-depth/climate-change/
United Nations Date Unknown *Climate Change* https://www.un.org/en/sections/issues-depth/climate-change/ accessed 22 January 2021

UN High Commissioner for Human Rights 2019 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=24735&LangID=E
United Nations Office of the High Commissioner for Human Rights 2019 *UN Expert Condemns Failure to Address Impact of Climate Change on Poverty* https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=24735&LangID=E accessed 27 June 2019

United States Department of Agriculture, Foreign Agricultural Service 2015 https://www.fas.usda.gov/data/south-africa-south-african-meat-market
United States Department of Agriculture, Foreign Agricultural Service 2015 *The South African Meat Market (Global Agricultural Information Network Report)* https://www.fas.usda.gov/data/south-africa-south-african-meat-market accessed 22 January 2021

United States Environmental Protection Agency Date Unknown https://www.epa.gov/greeningepa/greenhouse-gases-epa
United States Environmental Protection Agency Date Unknown *Greenhouse Gases at EPA* https://www.epa.gov/greeningepa/greenhouse-gases-epa accessed 8 February 2021

Van Dam 2017 http://edition.cnn.com/2017/05/31/africa/cape-town-drought/index.html
Van Dam D 2017 *Cape Town Contends with Worst Drought in Over a Century* http://edition.cnn.com/2017/05/31/africa/cape-town-drought/-index.html accessed 4 October 2017
WHO 2018 https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
World Health Organisation 2018 Noncommunicable Diseases https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases accessed 22 January 2021

Wills 2019 https://m.food24.com/Drinks/Beer/the-rise-of-non-alcoholic-beers-and-why-theyre-going-mainstream-20190625
Wills O 2019 The Rise of Non-alcoholic Beers and why They’re Going Mainstream https://m.food24.com/Drinks/Beer/the-rise-of-non-alcoholic-beers-and-why-theyre-going-mainstream-20190625 accessed 22 January 2021

Worldwatch Institute 2017 http://www.worldwatch.org/node/5443
Worldwatch Institute 2017 Meat Production Continues to Rise http://www.worldwatch.org/node/5443 accessed 8 November 2017

Zimmerman and Cliffs 2001 http://dwardmac.pitzer.edu/Anarchist_Archives/bookchin/coceol.html
Zimmerman ME and Cliffs E 2001 What is Social Ecology? http://dwardmac.pitzer.edu/Anarchist_Archives/bookchin/coceol.html accessed 6 December 2018

**List of Abbreviations**

AJAS  Asian-Australasian Journal of Animal Science
Am Psychol  American Psychologist
Australas J Environ Manag  Australasian Journal of Environmental Management
CCR  Constitutional Court Review
CJPRE  Chinese Journal of Population Resources and Environment
Duke Envtl L & Pol'y F  Duke Environmental Law and Policy Forum
Environ Sci Technol  Environmental Science and Technology
FAIRR  Farm Animal Investment Risk and Return
FAO  Food and Agriculture Organisation of the United Nations
Fordham Envtl L Rev  Fordham Environmental Law Review
Fordham L Rev  Fordham Law Review
Hydrol Earth Syst Sci  Hydrology and Earth System Sciences
IATP  Institute for Agriculture and Trade Policy
| Abbreviation | Full Name |
|--------------|-----------|
| IPCC         | Intergovernmental Panel on Climate Change |
| J Agric Environ Ethics | Journal of Agricultural Environmental Ethics |
| JEL          | Journal of Environmental Law |
| JERL         | Journal of Energy and Natural Resources Law |
| LEAD Journal | Law, Environment and Development Journal |
| JSI          | Journal of Social Issues |
| NEMA         | National Environmental Management Act 107 of 1998 |
| NEMACTAQA    | National Environmental Management: Air Quality Act 39 of 2004 |
| NEMWA        | National Environmental Management: Waste Act 59 of 2008 |
| NWA          | National Water Act 36 of 1998 |
| OECD         | Organisations for Economic Co-operation and Development |
| OIDA IJSD    | OIDA International Journal of Sustainable Development |
| PELJ         | Potchefstroom Electronic Law Journal |
| RSA          | Republic of South Africa |
| S Afr J Anim Sci | South African Journal of Animal Science |
| S Afr J Sci  | South African Journal of Science |
| SAJELP       | South African Journal of Environmental Law and Policy |
| SALJ         | South African Law Journal |
| SAPL         | Southern African Public Law |
| TEL          | Transnational Environmental Law |
| UN           | United Nations |
| Wash & Lee L Rev | Washington and Lee Law Review |
| WHO          | World Health Organisation |
| Wiley Interdiscip Rev Clim Change | Wiley Interdisciplinary Reviews - Climate Change |
| WWF          | World Wildlife Fund |