

Flexitarianism: traditional diets as social innovation for sustainability

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Abstract

Western diets are strongly encouraging ecologically unsustainable and unhealthy levels of meat consumption and in so doing, are displacing traditional diets locally and globally. This trend is supported by social ignorance and naivety that facilitate the swelling power wielded by the livestock industry. This is supported by industry stakeholders and government structures whose mixed messages ensure individuals remain unwittingly complicit and complacent, and ultimately socially disempowered. This paper describes the human, ecological and animal welfare consequences of excessive meat production and consumption, such as contribution to climate change, water depletion and pollution, land misappropriation and degradation, rainforest destruction, biodiversity and rapid species loss as well as the significant threats and challenges presented to human health and wellbeing. It offers flexitarianism (part-time vegetarianism) as a return to more traditional plant-based diets and socially innovative way to immediately combat the spectrum of negative impacts and empower people locally, regionally and globally to participate in a global transformation towards a more sustainable future. A case study of introducing flexitarianism through sustainability humanistic education is presented. It shows how this method redemocratises education and empowers individuals to counteract mainstream unsustainable practices.

Keywords: Education. Flexitarianism. Health. Meat consumption. Sustainability.

1 INTRODUCTION

Western diets strongly encouraging high levels of meat consumption are displacing traditional diets. This is happening at a time of global awareness about the impact fossil fuels have on climate change and related consequences for biodiversity and ecological health. Whilst numerous international efforts are being made to arrest carbon dioxide in the atmosphere with the energy sector slowly making a shift towards renewables, the livestock industry seems to be free of any responsibility. On the contrary, its products are claimed to be essential for feeding the world's population and special arrangements are made to incentivise growth in the industry, including exemptions from tax (e.g. carbon tax in Australia) and participation in carbon abatement (e.g. the Kyoto protocol).

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Such attitudes are hardly justifiable as there is ample evidence that diets with high levels of meat consumption are ecologically unsustainable and detrimental to human health. Despite this, there appears to be social ignorance or naivety that western type diets are a positive outcome from human progress. With the assumption that humans are at the top of the food chain, very few questions are being asked about the ethics of what we eat in relation to other species or to current and future generations (RAPHAELY; MARINOVA, 2013).

This paper sets out to dispel the myth about western diets, arguing for substantially lower levels of meat consumption, described as flexitarianism or part-time vegetarianism. Once people are made aware of the facts exposed in the scientific literature, they can quickly reduce the meat burden on the planet and on their personal health. Achieving flexitarianism is one example in educating for sustainability that aims at defeating the status quo and empowering people to create a better world. It is a significant step towards achieving sustainable development as currently the livestock industry is solely responsible for a massive share of the global greenhouse gas (GHG) emissions with estimates ranging from 18% (LEAD, 2006) to 51% (GOODLAND; ANHANG, 2009). On the other hand, flexitarianism is in many ways simply a return to traditional diets that are rich in vegetables, fruits, nuts, cereals and legumes. The food of the 21st century has moved largely away from such traditional diets to the extent that their re-introduction now represents a social innovation that offers immediate hope and solution.

The structure of the paper brings together two previous foci of our work, namely sustainability humanistic education (RAPHAELY et al., 2010; Raphaely; Marinova, 2013) and global green system of innovation (MARINOVA; TODOROV, 2009; MARINOVA et al., 2013) to address the issue of excessive meat consumption (and flexitarianism as an easily accessible alternative). We first outline the impacts of the livestock industry on ecological and human health. This is followed by a discussion of the role of education in the transformational system change required to empower students to create a better world. Quotes about such individual transformations are presented as signs of the social innovation taking place in order to stop excessive meat consumption and its devastating effects.

2 DESTRUCTIVENESS OF HIGH-MEAT DIETS

Each year 63 billion animals (or the equivalent to 9 animals per every person alive) are slaughtered for human consumption across the globe (FAO, 2012 statistics). However there are large differences in meat consumption between countries (see Table 1 which presents the latest available data on meat consumption for selected countries). The US leads the world with 120 kg per person per week followed by Kuwait (119 kg) and Australia (112 kg). Table 1 also shows the recommended maximum safe level of red meat intake which is less than 26 kg per person per year (or less than 500 g per person per week). This medical advice comes from the World

Cancer Research Fund (WCRF, 2013) as well as the American Institute of Cancer Research (AICR) (WCRF/AICR, 2007) and the UK government (CAMPBELL, 2011). In 2013, the new Australian dietary guidelines recommend an even lower red meat consumption of no more than 455 g per week per person (NHMRC, 2013).

By contrast to these maximum recommended safe standards, we see much higher and harmful levels of meat consumption across the industrialised world. Even for countries, such as China, where the population is progressively getting out of poverty, development equates to increased meat consumption to levels that significantly exceed the safe recommendations. The public health bodies around the world are concerned about the direct impact of excessive meat consumption on people's life; however the livestock sector is posing an even bigger threat to the planet and its inhabitants through its devastating impacts on climate change, water depletion and pollution, land misappropriation and degradation, rainforest destruction, biodiversity and rapid species loss.

Table 1 – Meat consumption, 2009 [kg] (continues)

	Per capita average annual consumption	Per capita average weekly consumption
<i>Recommended*</i>	< 26.0	< 500
USA	120.2	2.312
Kuwait	119.2	2.292
Australia	111.5	2.144
New Zealand	106.4	2.046
Austria	102.0	1.962
Argentina	98.3	1.890
Spain	97.0	1.865
Denmark	95.2	1.831
Portugal	93.4	1.796
Italy	90.7	1.744
Germany	88.1	1.694
France	86.7	1.667
Brazil	85.3	1.640
United Kingdom	84.2	1.619
Sweden	80.2	1.542
Venezuela	76.8	1.477
Greece	74.8	1.438
Chile	74.1	1.425
Russia	62.9	1.210
South Africa	58.6	1.127
China	58.2	1.119

(conclusion)

	Per capita average annual consumption	Per capita average weekly consumption
Saudi Arabia	54.4	1.046
South Korea	54.1	1.040
Bulgaria	53.0	1.019
Malaysia	52.3	1.006
Vietnam	49.9	0.960
Japan	45.9	0.883
Jordan	42.0	0.808
Libya	33.5	0.644
Uzbekistan	28.4	0.546
Thailand	28.1	0.540
Moldova	26.8	0.515
Egypt	25.6	0.492
Turkey	25.3	0.487
Angola	22.4	0.431
Laos	21.3	0.410
Peru	20.8	0.400
Pakistan	14.7	0.283
Congo	13.4	0.258
Indonesia	11.6	0.223
Malawi	8.3	0.160
Rwanda	6.5	0.125
Sri Lanka	6.3	0.121
Burundi	5.2	0.100
India	4.4	0.085
Bangladesh	4.0	0.077
Global	41.9	0.806

Source: Fao (2013) Meat + Food Supply Quantity, Livestock and Fish Primary Equivalent, Food Supply, Food and Agriculture Organization of the United Nations. Available in: <<http://faostat.fao.org/site/610/DesktopDefault.aspx?PageID=610#ancor>>. Accessed on: 19 may 2013.

* Studies show that meat consumption is nutritionally unnecessary. If it is consumed, the WCRF/AICR, the UK and Australian government amongst others, recommend for health reasons that no more than 0.5 kg per week (26 kg per annum) be consumed.

3 HUMAN HEALTH

Industrialised countries are the largest meat consumers (see Table 1) and they also have higher living standards. Whilst life expectancies in these countries are generally higher, this is the result of many development related factors, such as improvements in living conditions, advances in public health and medical technologies, access to medical and healthcare, education, economic resources, high

childbirth and childhood diseases survival rates (AIHW, 2011). However, despite the prolonged western life span,

[...] about 80 percent of elderly people (over age 65) suffer from at least one chronic disease and about 50 percent suffer from two or more chronic diseases. In the face of a steady increase of life expectancy and the dramatic rise in the spread of the leading chronic diseases, it is probable that humanity will soon experience, for the first time in modern history, a widespread old age characterised by a sub-optimal average quality of life, for a significantly longer period of time. (BARILLA CENTER, 2012, p. 239).

One of the main reasons for this is that the West is significantly exceeding the recommended safe levels of meat consumption (see Table 1). Studies by recognised international health related organisations repeatedly confirm the link between meat consumption and a wide range of serious non-communicable diseases, the most prominent being cancer. The AICR (WCR/AICR, 2007; AICR, 2013), WCRF (2013), the World Health Organisation's International Agency for Research on Cancer (IARC) and the European Prospective Investigation into Cancer and Nutrition (EPIC) (INTERNATIONAL AGENCY FOR RESEARCH ON CANCER, 2013) continually show the negative connection between the consumption of red and processed meat and various cancers, particularly bowel cancer (GROENEN et al., 1976; JAKSZYN; GONZÁLEZ, 2006; FERLAY et al., 2010). Other studies have also conclusively linked cancers of the oesophagus, liver, lung, stomach, bladder and prostate to red and processed meat consumption (CROSS et al. 2007, 2011; FERRUCCI, 2010). Obesity, hypertension, diabetes, heart disease, stroke, cancers, rheumatoid arthritis, multiple sclerosis, lupus, gallstones, atherosclerosis, verticillitis, food-borne illnesses, osteoporosis, immune system disorders, allergies and asthma are just some of the many other costly, debilitating and potentially life-threatening illnesses conclusively linked to excessive meat consumption, the incidence of which plummets when more traditional plant-based diets persist (APPLEBY, 1999; AYRES, 1999; GARDNER; HALWEIL, 2000; WHO, 2003; FOX, 2007; POPKIN, 2009; MORITZ, 2009; WCRF, 2011).

Given the credibility of these research findings, one would expect people to be aware of the risks from excessive meat consumption and the health implications from such easily preventable causes. Yet the pervasive and insidious influence of the livestock sector backed up by government has ensured this is not happening and instead meat continues to be promoted as a healthy, necessary food source (USDA, 2012; AUSTRALIAN HEALTHY FOOD GUIDE, 2012; RUSSELL, 2009). The result is an increasingly sick Western population, a horrifying prophecy that today's children may not outlive their parents (STONE, 2011). It is sad testimony to the great disparity in wealth that, perhaps for the first time in human history, there are more overfed (1 billion) than hungry (800 million) individuals in the world (LEAD, 2006, p. 6; HENNING, 2011, p. 68). Ironically due to the global duplicity and spread of wes-

tern hegemony, throughout the emerging world people climbing out of poverty are shifting from traditional diets of grains, vegetables pulses, roots and tubers to high meat consumption (POPKIN, 2001).

Consequently non-communicable nutrition-related diseases are overtaking communicable disease (GOODLAND, 2001; STAMOULIS et al., 2004; KARELINA; FRITSCHER, 2011). For example, the rate of increase of global cancer is now more than 4 times faster than the spread of HIV (WCRF, 2013). What is urgently needed is not simply finding ways to live longer but finding ways to live longer and healthier without the onset of non-communicable and chronic diseases (BARILLA CENTER, 2012). Flexitarianism is a viable immediate way to reduce the impacts of red meat consumption on human health, particularly if we look deeper into the causes of why eating animals is not good for people.

Antibiotics, growth hormones and genetic modifications have become the basis for industrial livestock production. Despite calls by the world's medical community to cease the non-therapeutic use of antibiotics, over half of all antibiotics produced worldwide are now administered non-therapeutically to meat-animals (LEAD, 2006, p. 273) and in the US this figure is 90% (LOGLISCI, 2010). The consequences for humanity are ominous and include a global "epidemic" of antibiotic resistant infections. Further, the breeding of genetically modified and uniform, sickness-prone, antibiotic maintained animals in factory farms creates perfect environments for rapid selection and amplification of pathogens and an increasing risk for disease entrance and dissemination. By contributing to the spread of antibiotic resistant infections, chronic and new diseases, mass production and overconsumption of meat now constitutes one of the single greatest threats to public health.

4 ECOLOGICAL HEALTH

Climate change looms as one of the biggest environmental crises in human history. A 2010 Canadian Study warns of a "livestock greenhouse gas boom" – where soaring international production of livestock could, by 2050, release enough carbon into the atmosphere to

[...] single-handedly exceed 'safe' levels of climate change: the livestock sector's emissions alone, if continuing on the current demand-supply trajectory, could send temperatures above the 2 degrees Celsius rise optimistically said to be the threshold above which climate change will be dangerously destabilising. (PELLETIER; TYEDMERS, 2010, p. 3).

Yet estimates show that a 25% reduction in global consumption of livestock products would yield the 12.5% reduction in global anthropogenic GHG emissions that delegates tried, but failed, to negotiate in 2009 at the UN Climate Conference in Copenhagen (GOODLAND, 2010).

Livestock is a primary contributor to salt- and freshwater pollution all over the world. Animal wastes, antibiotics, hormones, chemicals, fertilisers and pesticides used for feed crops, and sediments from eroded pastures result in eutrophication or “dead zones” in fresh and marine water bodies, destroyed ecosystems such as coral reefs, massive fish kills and human illness (LEAD, 2006; HENNING, 2011). Soil compaction resulting in reduced infiltration, degraded watercourse banks, drying up of floodplains and lowering water tables are also directly attributable to livestock farming practices (LEAD, 2006). Indirectly through its contribution to climate change, the sector is also principally responsible for the acidification of the global oceans.

The livestock sector accounts for 10% of global human water use, mostly for irrigation of feed crops (DEUTSCH et al., 2010). Overall, it is estimated that producing one kilogram of animal protein needs 100 times more water than producing one kilogram of grain protein for human consumption (PIMENTEL; PIMENTEL, 2003; NATIONAL GEOGRAPHIC, 2010). This is an inefficient use of an increasingly scarce environmental resource. Around the world, as water is increasingly diverted to growing feedstock for meat animals instead of crops for direct consumption, millions of wells are drying up (AYERS, 1999) and already stretched freshwater stocks are being polluted during meat production. According to Henning (2011, p. 71),

[...] given that eating meat is nutritionally unnecessary and detracts more from the global supply of food than it provides, not only is the inefficient and wasteful use of increasingly scarce freshwater ecologically unsustainable, it is morally unacceptable to continue to preference the acquired taste of meat over the need for life-giving freshwater.

Considering both direct and indirect effects, food animals are leading causes for deforestation, land degradation and desertification. Being the single largest anthropogenic user of land, the livestock sector occupies 30% of the land surface of the planet, exploits at least 26% of the world’s ice-free, terrestrial surface for grazing, 33% of all arable land is dedicated to feed crop production and in all accounts for 70% of all agricultural land use (FAO, 2006). Cereals are thus shifted from direct human consumption to indirect consumption of meat, an inefficient food conversion process where a significant “shrinkage” of cereals occurs (YOTOPOULOS, 1985) and world poverty is perpetuated. Both the clearing and subsequent cultivation of land for pasture or feed crops is of great concern (HENNING, 2011, p. 72) causing desertification, decreased vegetation, reduction of available water, reduction of crop yields, increased salinity and erosion of soil (IPCC, 2007) as well as invasion by alien species. The value and quality of the land used for meat animals are significantly compromised or destroyed as a habitat or natural resource for alternative purposes.

Increasing meat demand (referred to as the “hamburgerization of our forests”, (MYERS, 1984, p. 127)) is the biggest force in the expansion of agriculture and agriculture is the world’s biggest cause of deforestation (AYERS, 1999). Se-

venty percent of previous Amazon forest is now cattle pasture and feed crops cover a large part of the remainder (FAO, 2006). Brazil, the country with the world's largest commercial cattle herd, loses around 1.8 million hectares a year of the Amazon forest (ROFE, 2013). In Central America, between 2004 and 2005, an estimated 1.2 million hectares of rainforest was cut down as a result of soybean expansion for feed crops (FAO, 2013).

Forests, whilst confined to countries, are essential for the survival of the global population containing 80% of the world's species of land vegetation, being a vital source of global oxygen supply, moderating climates, preventing floods, defending against soil erosion, recycling and purifying water, offering habitat for millions of plants and animals, providing housing, wood and cooking fuel and embodying beauty, inspiration and solace. Yet every second, an area the size of a football field is destroyed forever (LEAD, 2006). A single Standard American Diet (SAD) meal (assuming ~30% of the calorific intake is derived from meat) levels 17 m² of rain forest (CITY OF CINCINNATI, 2008).

In the face of increasing human health challenges, biodiversity is the basis for resilience (CBD, 2011). With only 1% of tropical rainforests tested for medicinal benefits, they already supply 25% of all medicines and researchers believe that these ecosystems contain the medicines of the future (SUSSMAN, 2000, p. 67; GORE, 1993, p. 23). Over half (~60%) of all medicines used today are sourced from nature, including drugs such as aspirin and quinine (ROSE, 2009). According to Bernstein (2010), "[...] two thirds of all new drugs licensed in the US from 1981-2006 would not exist if they hadn't been found in or patterned after compounds that nature designed. This proportion is yet higher for cancer drugs and antibiotics."

Clearly, excessive meat production and consumption, by contributing significantly to climate change, natural resource pollution and degradation, deforestation and loss of biodiversity, are creating yet unquantified, but serious direct and indirect threats to human life. Such ecological and human health destruction may be largely prevented when these facts are made transparent prompting individuals to reject a high-meat diet and personally contribute towards sustainability.

5 SUSTAINABILITY HUMANISTIC EDUCATION

The years 2005-2014 were declared by UNESCO the Decade of Education for Sustainable Development which should "[...] allow every human being to acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future." (UNESCO, 2012). It was acknowledged that a new kind of education was needed to facilitate critical thinking, participatory methods, imagining of future scenarios and collaborative decisions. This was in response to mainstream western education which Evans (2009) describes as a "shattered mirror". Firstly, it provides a fragmented view of the world through specialised discipline knowledge; hence each broken piece of glass reflects only a particular section of the picture and the mirror itself

cannot present a realistic complete view of the world. Secondly, education is always backward looking, that is the mirror only reflects what has already been created without allowing for futuristic images, forecasts or dreams.

The Decade also implies that there is need to unteach unsustainability or practices that have led to reckless and irresponsible actions causing ecological and human deterioration. More often than not, such practices are encouraged by what is perceived as economically rational decision-making. For example, increased productivity and efficient use of resources can result in encouragement to consume more and cause further resource depletion. This is exactly the case with meat. Increased productivity through factory farming, including efficient ways of animal feeding and breeding, has resulted in lower prices of meat which do not adequately represent the value of the resources used. The “affordability” of meat has encouraged high levels of consumption returning good profits to the livestock sector but causing serious ecological and human harm. This has been perpetuated in the name of progress and under the guise of feeding the rising numbers of people on earth.

Education was charged with the task of facilitating such a mechanical progress of doing things better faster and more effectively. Its historic stepping blocks include progressivism, objectivity, rationalism, reductionism, mechanistic view of reality, scientism, efficiency, anthropocentrism, instrumental reasoning, compartmentalisation of life, humans in opposition to nature and shrinking of the world for the benefit of the human race (please refer to Table 2 for clarification of these concepts). They promote habits, attitudes, perceptions and behaviours that do not challenge or acknowledge any wrongdoing in relation to excessive meat consumption.

Table 2 – Comparison between current and education for sustainability (continues)

	Current education (SPRETNAK, 1999)		Education for sustainability	
Progressivism	Linear progression up, constant growth	Adaptivism	Constant change and adjustment	
Objectivism	Rational independent reality	Mixed reality	Objectivity and subjectivity co-exist	
Rationalism	No place for emotions and spirituality	Down-to-earth	People’s actions are based on knowledge but highly dependent on feelings	
Mechanistic worldview	Understanding of matter most important	Creativity	Not only cause and effect; there are creative unfoldings	
Reductionism	Understanding the whole if we understand its parts	Systems thinking	Understanding the relationships and new emerging properties	
Scientism	Natural sciences dominate	Practicism	User-inspired	

(conclusion)

Current education (SPRETNAK, 1999)		Education for sustainability	
Efficiency	Standardisation, bureaucratisation, hierarchies	Outcome-based	Questioning of what we want to achieve
Anthropocentrism	Human species are most important	Responsible	Human species are guardians
Instrumental reasoning	Modes of thinking used rather than determining of values (e.g. economism)	Values dominated	Various instruments can be used but guided by values
Human opposition to nature	Economic development	Embeddedness in nature	Harmonious and integrated development
Compartmentalisation of life	Family, work, study, social life	Integration of life	Common attitudes and actions
Shrinking of the world	The "sacred" human	Opening of the world	The "sacred" universe

Source: Raphaely et al. (2010).

With education being "[...] a primary institution towards affecting social and ecological change for the better" (KAHN, 2003), educating for sustainability requires vast personal and collective paradigm shifts – completely new individual and global ways of being and doing. Education is at the core of a social and technological orientation that assists a global green system of innovation (MARINOVA et al., 2013) with the aim to transform the world economy towards sustainability. Rather than supporting the status quo and preparing students for already available jobs in society, the role of sustainability education is to compensate for the transformational system failure (WEBER; ROHRACHER, 2012) in the world we have known since industrialisation. Yet because there are very few examples illustrating how this new way of educating for sustainability might work, it can sometimes feel imaginary, illusive or impossible. Flexitarianism provides a tangible example of educating for social innovation.

The application of almost all sustainability concepts, such as equity, diversity, locality and bioregionalism are universal, interconnected, all-encompassing and broad-based. They need to be connected not only in the classroom but also in real life. Each topic is directly and indirectly linked to a wide range of other related topics, making sustainability education a web of interconnections which the student needs to be empowered to understand, question and challenge in the search for better practices. This requires envisioning a new world or a possible world – a healthier place for all species where life interacts with itself and all around it in a completely different way. Learning sustainability is a journey into a brave new worldview and charting an unproven direction. It also requires spiritual, emotional and intellectual strength to deal with all obstacles coming from vested interests, social inertia and often scepticism. In current western education, hope for the future can easily be replaced by fear from, and for the future, and sustainability students and teachers

have to work continuously within this space of negativity and lack of encouraging good news stories. The loss of faith in humanity hurts, and sustainability education requires an honest look at who we are, where we are going and how much potential we have to change current trajectories.

This is not an easy journey but it can be achieved. Below we illustrate that our approach to teaching sustainability through sustainability humanistic education (RAPHAELY; MARINOVA, 2013) and using flexitarianism as an example, can contribute towards social innovation for positive transformation. Sustainability humanistic education has at its core the principles of adaptivism, existence of mixed realities, down-to-earth approach, creativity, systems thinking, outcome-based practicism, responsibility, value-based actions, embeddedness in nature, integration of life and opening of the world (Table 2 and Table 3). Its distinct features, namely: recognising, understanding and accepting the changing world; imagining and visualising better possible realities; developing purposeful creative solutions; and resolutely acting to implement these opportunities, are explained using examples related to flexitarianism.

Table 3 – Sustainability humanistic education

1	Constructs a critical and creative theory and practice of society aimed at a sustainable future
2	Is filled with promise and powerful examples of obtained success
3	Provides knowledge and science filled with love, impetus and future hope
4	Always remains positive and participatory
5	Engages in ongoing forms of permanent critique of authority
6	Includes a "Project of Possible Worlds" or "Another Possible World"
7	Facilitates students joining with people in the community, social movements, governments and progressive groups
8	Educates students for active and critical citizenship
9	Always focusses on transdisciplinarity
10	Strives to liberate potentials for the reconstruction of a better society
11	Highlights the interconnectedness of all things and all actions
12	Facilitates networking and bonds amongst students
13	Emphasises the relationship between people and the natural environment in terms of immediate environmental protection
14	Educates about feelings – feeling and caring and living as part of a whole
15	Educates for understanding, empathy and compassion – solidarity as a condition of our survival
16	Educates for voluntary simplicity and quietness

Source: Raphaely et al. (2010).

5.1 RECOGNISING, UNDERSTANDING AND ACCEPTING THE CHANGING WORLD

The new ways of understanding the changing world is through user-inspired science (CLARK, 2007) that looks for knowledge within, between and across all dis-

ciplines and understands the relationships, interconnectedness and new emerging properties informed by systems thinking. An important aspect of this is not to block but rather to encourage emotional responses. Incorporating feelings in the teaching process is essential in dealing with the rapidly changing world.

Food as the focus of the unit students take in their Master in Sustainability Policy degree. Although food is a basic activity, not many have examined or questioned their eating habits. Through a weekly roster, students are encouraged to share with their colleagues food that they have prepared or bought and which is more sustainable than which they normally consume. The complexity of food rapidly emerges as an area that requires understanding the multifarious relationships surrounding the growing, transporting, buying, preparing, sharing as well as other aspects including health, tradition and tastes. Students soon acknowledge how difficult it is to find the finer details behind the food available in supermarkets, local shops or growers' markets. After accepting that many of the images they have (e.g. of the family farm with happy chickens and cows) are no longer true, accurate or within their personal comfort levels, students often react emotionally. They feel that they have unwittingly blocked the reality for too long or have been deceived. They may experience anger, guilt, fear, betrayal or sense of lost opportunities. On the other hand, this comes with the realisation that they hold the power to change what they eat and thus the world. Below is a quote: "I used to live with a family of vegetarians. We shared a house together for 7 years. Now I am angry that they never told me why they were vegetarian and shocked that I never asked. Until now I have missed the opportunity to change my diet and make a meaningful difference. Now I know why I am doing it, I have also come to understand that what's better for the planet is also better for me."

5.2 IMAGINING AND VISUALISING BETTER POSSIBLE REALITIES

A central philosophy and resultant way of teaching, based on Berne's hypothesis described in the "science of acting" (KOGAN, 2010), is that "[...] one of the most important things in life is to understand reality and to keep changing our images to correspond to it, for it is our images which determine our actions and feelings." (BERNE, 1969, p. 53 apud KOGAN, 2010). Knowledge has limitations, but imagination doesn't. Imagining a better possible world that holds promise and is full of hope empowers students to confront the status quo. The more emotionally and intellectually honest they are about reality, "[...] the easier it will be for us to attain happiness and stay happy in an ever changing world." (BERNE, 1969, p. 53 apud KOGAN, 2010). Such truthful optimism allows students to re-envisage themselves through imagination and belief and, in so doing, to better embrace their role as sustainability agents.

Once the students start to think about the heavy negative ecological and human impact the standard Australian diet has, they also begin to see opportuni-

ties. The pessimism about climate change and the failure to negotiate a mutually acceptable agreement at a global level is replaced by informed optimism. Students realise that with a shift towards flexitarianism the majority of the GHG emission reduction would come from the countries responsible for their high levels in the first place. They start imagining the world without the threat of a run-away climate change and the possibility of freeing up most needed time to develop renewable and other technologies. "This gives me hope! It's not just doom and gloom." Realising that their lecturers are leading by example, the students see and begin to believe in a different reality. They start to create images of a more sustainable world. By responding to the deteriorating world around them, they become advocates and agents of social change.

5.3 DEVELOPING PURPOSEFUL CREATIVE SOLUTIONS

Changing the world requires learners to understand that they are not purposeless pawns in a game of destruction but rather purposeful agents in creating a more sustainable world. They need to learn to create opportunities and remain constantly positive and proactive in their search for practical solutions as they strive to liberate potentials for the reconstruction of a better society. Such problem-solving requires acknowledging that we live in a mixed reality where subjectivity, emotion and objective responses have equal relevance in creativity.

This is probably the most interesting stage as far as teaching flexitarianism as a social innovation is concerned. As food is generally a shared activity, it is important for students to create practical solutions in their home and social environments to reduce meat consumption. Students are eager to share some of their stories: "As a woman I have a lot of say as to what should be eaten at home. If I prepare a vegetarian meal, my partner is too lazy to cook anything else"; "I spent Easter with a Greek family but I had only vegetarian food. It wasn't difficult as there was a lot of salad and bread. I would have never considered doing this before"; "The unit inspired me to have a carbon-neutral wedding!"; "I hosted a vegetarian New Year's party. People each had to bring a vegetarian plate and they embraced the novelty"; "I started to ask the right questions – why am I eating so much meat?"; "I have dieted before as I wanted to lose weight and it was hard! Stopping eating meat was easy. I don't miss it at all..."

5.4 RESOLUTELY ACTING TO IMPLEMENT THESE OPPORTUNITIES

Through recognition, understanding, optimism and developing creative solutions students are able to become key proponents in the movement for change. Combined with awareness that humans are guardians, responsible for sustaining life on Earth, they are also empowered to help and be examples to others through all-inclusive active citizenship in harmony with nature.

As lecturers we do not always keep in contact with the students after they complete their studies. However, we often hear directly or through word of mouth about the long-term impact the food focus continues to have on former students. "This unit was transformational for me"; "The unit has empowered me to change my life as nothing before." Students feel stimulated and competent to help others and continue to lead by example in reducing meat consumption. As such they spread the social innovation.

The sustainability humanistic education approach is based on the traditions furthering democracy (GRIGOROV, 2009), but aims to ignite a mass groundswell towards an all-inclusive paradigm shift that will help the Earth's life-supporting attributes survive for future generations. Flexitarianism is one example of how education can be "[...] essentially transformative, constructivist, and participatory." (MEDRICK, 2005, p. 1).

6 CONCLUSION

It was already reported in 1961 that a vegetarian diet could prevent 90-97% of heart and other non-communicable diseases and many called for a return to a more "traditional" plant-based diet for environmental, social and health reasons (LAPPÉ, 1991). Yet, despite years of credible conclusive findings showing the disturbing health and environmental impacts of excessive meat consumption, and the benefits of plant-based diets, the science continues to be concealed behind political and food industry propaganda and vested interests (MORITZ, 2009; SAFRAN FOER, 2009).

The livestock sector is largely to blame for our world being threatened by climate change, biodiversity loss, human health challenges and natural resources deterioration. Western diets based on high meat consumption support this ecological and human destruction. However, most people, including students starting our Masters unit, are unaware of this. Working through a sustainability humanistic education process allows for students to arrive at their own creative strategies, solutions and social innovations. By using food as a core theme, participants are able to re-examine western diets and re-interpret the value of adopting predominantly traditional lower-meat diets.

Flexitarianism, or part-time vegetarianism, is a socially innovative, personally empowering individual and collective opportunity to counter the power of the livestock industry and government duplicity, a perfidy perpetuated and supported through western tertiary education systems. It is a social innovation that offers hope in igniting deep transformational processes within society.

Flexitarianismo: dietas tradicionais, como a inovação social para a sustentabilidade

Resumo

Dietas ocidentais estão incentivando fortemente os níveis ecologicamente insustentáveis e insalubres do consumo de carne, e, assim fazendo, estão deslocando dietas tradicionais localmente e globalmente. Essa tendência é apoiada por ignorância social e ingenuidade que facilitam o poder de inchamento exercido pela indústria do gado. Essa opinião é corroborada pelas partes interessadas da indústria e estruturas governamentais, cujas mensagens mistas garantem indivíduos que permanecem involuntariamente cúmplices e complacentes, e, finalmente, socialmente impotentes. Este artigo descreve as consequências humanas, ecológicas e de bem-estar animal de produção e consumo excessivo de carne, como a contribuição para a mudança climática, o esgotamento da água e poluição, a apropriação indevida de terras e degradação, a destruição da floresta, a biodiversidade e a perda rápida de espécies, bem como as ameaças significativas e desafios para a saúde humana e o bem-estar. Oferece flexitarianismo (vegetarianismo) como um retorno às dietas tradicionais à base de plantas e de forma socialmente inovadora para combater de imediato o espectro de impactos negativos e capacitar as pessoas localmente, regionalmente e globalmente para participarem de uma transformação global em direção a um futuro mais sustentável. Um estudo de caso da introdução de flexitarianismo por meio da educação humanística de sustentabilidade é apresentado. Ele mostra como esse método redemocratiza a educação e capacita pessoas para contrariar práticas sustentáveis tradicionais.

Palavras-chave: Educação. Flexitarianismo. Saúde. Consumo de carne. Sustentabilidade.

REFERENCES

AMERICAN INSTITUTE FOR CANCER RESEARCH. **Red and Processed Meats:**

The Cancer Connection. 2013. Available in: <http://www.aicr.org/site/PageServer?pagename=elements_red_processed_meat>. Accessed on: 21 may 2013.

APPLEBY, P. N. et al. The Oxford Vegetarian Study: an overview. **American Journal of Clinical Nutrition**, v. 70, p. 525S-531S, 1999.

AUSTRALIAN HEALTHY FOOD GUIDE. 2012. Available in: <<http://www.healthyfoodguide.com.au/>>. Accessed on: 21 may 2013.

AUSTRALIAN INSTITUTE OF HEALTH AND WELFARE. **What affects life expectancy?** 2011. Available in: <<http://www.aihw.gov.au/what-affects-life-expectancy/>>. Accessed on: 21 may 2013.

AYERS, E. Will We Still Eat Meat? **Time Magazine**, 1999. Disponível em: <<http://www.time.com/time/magazine/article/0,9171,992523,00.html>>. Accessed on: 21 may 2013.

BARILLA CENTER FOR FOOD & NUTRITION IN COLLABORATION WITH WORLD WATCH INSTITUTE (BARILLA CENTER). **Eating Planet 2012. Nutrition Today: A Challenge for Mankind and for the Planet.** Citta di Castello: Edizioni Ambiente, 2012.

BERNE, E. **A Layman's Guide to Psychiatry and Psychoanalysis.** London: Penguin, 1969.

BERNSTEIN, A. **Human Health under Threat from Dramatic Reduction of Plant and Animal Species.** Royal College of Surgeons in Ireland, 2010. Available in: <<http://www.rcsi.ie/index.jsp?p=110&n=903&a=1629>>. Accessed on: 22 may 2013.

CAMPBELL, D. Cut red meat intake and don't eat ham, say cancer researchers. **The Guardian**, 2011. Available in: <<http://www.guardian.co.uk/world/2011/may/23/cut-red-meat-cancer-researchers>>. Accessed on: 21 may 2013.

CITY OF CINCINNATI. **Climate Protection Action Plan:** The Green Cincinnati Plan. Cincinnati, OH: Office of Environmental Quality, 2008.

CLARK, W. C. Sustainability science: a room of its own. **Proceedings of the National Academy of Science USA**, v. 104, p. 1737-1738, 2007.

CONVENTION OF BIOLOGICAL DIVERSITY. **Global biodiversity outlook 3.** 2010. Available in: <<http://www.cbd.int/gbo/gbo3/doc/GBO3-final-en.pdf>>. Accessed on: 22 may 2013.

CROSS, A. J. A prospective study of red and processed meat intake in relation to cancer risk. **PLoS Medicine**, v. 4, n. 12, p. 325, 2007. Available in: <<http://www.plosmedicine.org/article/info:doi/10.1371/journal.pmed.0040325>>. Accessed on: 21 may 2013.

CROSS, A. J. et al. Meat consumption and risk of esophageal and gastric cancer in a large prospective study. **American Journal of Gastroenterology**, v. 106, n. 3, p. 432-442, 2011.

DEUTSCH, L. et al. Watermediated Ecological Consequences of Intensification and Expansion of Livestock Production. In: STEINFELD, H. et al. (Ed.). **Livestock in a Changing Landscape**, London: Island Press, 2010.

EVANS, T. L. Reflections in a broken mirror: Higher education and the challenges of sustainability. **Green Theory & Praxis: The Journal of Ecopedagogy**, v. 5, n. 1, p. 1-13, 2009.

FERLAY, J. et al. **Globocan 2008 v1.2:** Cancer Incidence and Mortality Worldwide. Lyon, France: Agency for Research on Cancer Press, 2010.

FERRUCCI, L. M. Meat and Components of Meat and the Risk of Bladder Cancer in the NIH-AARP Diet and Health Study. **Cancer**, v. 116, n. 18, p. 4345-4353, 2010.

FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS. 2012. Available in: <<http://faostat.fao.org/site/569/DesktopDefault.aspx?PageID=569#ancor>>. Accessed on: 14 fev. 2012.

_____. **Livestock Impacts on the Environment**. 2006. Available in: <<http://www.fao.org/ag/magazine/0612sp1.htm>>. Accessed on: 22 may 2013.

_____. **Livestock's role in deforestation**. 2013. Available in: <<http://www.fao.org/agriculture/lead/themes0/deforestation/en/>>. Accessed on: 22 may 2013.

FOX, M. Meat raises lung cancer risk, too, study finds, **Reuters**, 2007. Available in: <<http://www.reuters.com/article/2007/12/11/us-cancer-meat-idUSN1043849120071211>>. Accessed on: 21 may 2013.

GARDNER, G.; HALWEIL, B. **Overfed and Underfed: The Global Epidemic of Malnutrition**. Washington, DC: Worldwatch Institute, 2000.

GOODLAND, R.; ANHANG, J. Livestock and Climate Change. **World Watch Institute**, nov./dec. 2009. Available in: <<http://www.worldwatch.org/files/pdf/Livestock%20and%20Climate%20Change.pdf>>. Accessed on: 21 may 2013.

GOODLAND, R. How The Food Industry Can Reverse Climate Change Quickly and Profitably. GLOBAL FORUM FOR FOOD AND AGRICULTURE, INTERNATIONAL GREEN WEEK, 1., 2010, Berlin. **Annals...** Berlin, 2010. Available in: <<http://awellfedworld.org/sites/awellfedworld.org/files/pdf/GoodlandFoodIndustryBerlinJan2010.pdf>>. Accessed in: 21 may 2013.

_____. **The Westernisation of Diets: The Assessment of Impacts in Developing Countries – with special reference to China**. 2001. Available in: <<http://sanctuary.bravebirds.org/wp-content/uploads/2009/05/goodlandchina.pdf>>. Accessed on: 14 feb. 2012.

GORE, A. **Earth in Balance: Ecology and the Human Spirit**. New York: Plume, 1993.

GRIGOROV, S. Let education save the Earth! Towards the realisation of new sustainable forms of humanistic education. **Green Theory & Praxis: The Journal of Ecopedagogy**, v. 5, n. 1, p. 93-110, 2009.

GROENEN, P. J. Determination of eight volatile nitrosamines in thirty cured meat products with capillary gas chromatography-high-resolution mass spectrometry: the presence of nitrosodiethylamine and the absence of nitrosopyrrolidine. **International Agency for Research on Cancer Scientific Publications**, v. 14, p. 321-331, 1976.

HENNING, B. Standing in livestock's 'Long Shadow': the ethics of eating meat on a small planet. **Ethics and the Environment**, v. 16, n. 2, p. 63-94, 2011.

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE. **Climate Change 2007: Synthesis Report**. 2007. Available in: <<http://www.ipcc.ch>>. Accessed on: 21 may 2013.

INTERNATIONAL AGENCY FOR RESEARCH ON CANCER. **EPIC Project**. Lyon, France: World Health Organization, 2013. Available in: <<http://epic.iarc.fr/>>. Accessed on: 21 may 2013.

JAKSZYN, P.; GONZÁLEZ, C. A. Nitrosamine and related food intake and gastric and oesophageal cancer risk: a systematic review of the epidemiological evidence. **World Journal of Gastroenterology**, v. 12, n. 27, p. 4296-4303, 2006.

KAHN, R. Towards ecopedagogy: weaving a broad-based pedagogy of liberation for animals, nature and the oppressed people of the Earth. **Journal for Critical Animal Studies**, v. 1, n. 1, 2003. Available in: <<http://www.criticalanimalstudies.org/volume-i-issue-i-2003/>>. Accessed on: 22 may 2013.

KARELINA, Z.; FRITSCHER, H. Leveraging agriculture to tackle non-communicable diseases: report on a seminar leading up to the UN high-level meeting on non-communicable diseases. **Public Health Nutrition**, v. 14, n. 12, p. 2268-2269, 2011.

KOGAN, S. **The Science of Acting**. New York: Routledge, 2010.

LAPPÉ, F. M. **Diet for a Small Planet**. New York: Ballantine Books, 1971.

LIVESTOCK ENVIRONMENT AND DEVELOPMENT INITIATIVE. **Livestock's Long Shadow: Environmental Issues and Options**. Rome: Food and Agriculture Organization of the United Nations, 2006.

LOGLISCI, R. **New FDA Numbers Reveal Food Animals Consume Lion's Share of Antibiotics**. Baltimore: Center for a Livable Future, 2010. Available in: <<http://www.livablefutureblog.com/2010/12/new-fda-numbers-reveal-food-animals-consume-lion-s-share-of-antibiotics>>. Accessed on: 21 may 2013.

MARINOVA, D.; GUO, X.; WU, Y. China's transformation towards a global green system of innovation. **Journal of Science and Technology Policy of China**, 2013.

MARINOVA, D.; TODOROV, V. Climate change and global green system of innovation. Proceedings of the 5th DUBROVNIK CONFERENCE ON SUSTAINABLE DEVELOPMENT OF ENERGY WATER AND ENVIRONMENT SYSTEMS, 5., 2009, Dubrovnik, Croatia. **Annals...** Dubrovnik, Croatia, 2009. CD-ROM. Available in: <<http://www.clubofrome.at/2009/dubrovnik/>>. Accessed on: 07 may 2012.

MEDRICK, R. **Education as Sustainability, Ph.D.** Program in Sustainability Education. Prescott: Prescott College, 2005.

MORITZ, A. **Eating Meat Kills More People than Previously Thought**, **NaturalNews.com**. 2009. Available in: <http://www.naturalnews.com/025957_meat_eating_cancer.html>. Accessed on: 21 may 2013.

MYERS, N. **The Primary Source: Tropical Forests and Our Future**. London, New York: W.W. Norton & Company, Inc., 1984.

NATIONAL GEOGRAPHIC. **The Hidden Water We Use**. 2010. Available in: <<http://environment.nationalgeographic.com/environment/freshwater/embedded-water/>>. Accessed on: 14 feb. 2011.

NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL. **Eat For Health: Australian Dietary Guidelines**. Australia: Department of Health and Ageing, 2013. Available in: <http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/n55a_australian_dietary_guidelines_summary_book_0.pdf>. Accessed on: 21 may 2013.

PELLETIER, N.; TYEDMERS, P. **Forecasting potential global environmental costs of livestock production 2000-2050**. United States of America: National Academy of Sciences, 2010. Available in: <<http://www.pnas.org/content/early/2010/09/27/1004659107.abstract#rel-related-article>>. Accessed on: 21 may 2013.

PIMENTEL, D.; PIMENTEL, M. Sustainability of meat-based and plant-based diets and the environment. **American Journal of Clinical Nutrition**, v. 78, p. 660s-663s, 2003.

POPKIN, B. M. The nutrition transition and obesity in the developing world. **Journal of Nutrition**, v. 131, n. 3, p. 871S-873S, 2001.

RAPHAELY, T.; MARINOVA, D. **Flexitarianism**: a more moral dietary option. **International Journal of Sustainable Society**, v. 6, n. 1-2, p. 189-211, 2013.

_____. Sustainability humanistic education: a new pedagogy for a better world. **International Journal of Education Economics and Development**, 2013.

RAPHAELY, T.; MARINOVA, D.; TODOROV, V. Sustainability education: what on earth are we doing? **Management and Sustainable Development**, v. 26, n. 2, p. 49-60, 2010.

ROFE, A. **Deforestation**: Livestock destroying the living earth. 2013. Available in: <<http://www.stockfreeorganic.net/deforestation-livestock-destroying-the-living-earth/>>. Accessed on: 22 may 2013.

ROSE, M. **Making the Business Case for Biodiversity, The Centre for Social Impact**. 2009. Available in: <<http://www.csi.edu.au/assets/assetdoc/cedd0a540603f862/Lecture%20Series%20No.%205%20-%20Qantas%20Fdn%20Mark%20Rose.pdf>>. Accessed on: 22 may 2013.

RUSSEL, G. **CSIRO Perfidy**. Australia: Vivid Publishing Fremantle, 2009.

SAFRAN FOER, J. **Eating Animals**. London: Penguin Books, 2009.

SPRETNAK, C. **The Resurgence of the Real**: Body, Nature and Place in a Hypermodern World. New York: Routledge, 1999.

STAMOULIS, K.; PINGALI, P.; SHETTY, P. Emerging challenges for food and nutrition policy in developing countries. **Electronic Journal of Agricultural and Development Economics**, v. 1, n. 2, p. 154-167, 2004.

STONE, G. (Ed.). **Forks over Knives**: The Plant-Based Way to Health. New York: The Experiment LLC, 2011.

SUSSMAN, A. **Dr. Art's Guide to Planet Earth**. Vermont: Chelsea Green Publishing, 2000.

UNESCO. **Education for Sustainable Development**. 2012. Available in: <<http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-sustainable-development/>>. Accessed on: 19 may 2013.

UNITED STATES DEPARTMENT OF AGRICULTURE. **ChooseMyPlate.gov**. 2012. Available in: <<http://www.choosemyplate.gov/>>. Accessed in: 21 may 2013.

WEBER, K. M.; ROHRACHER, H. Legitimizing research, technology and innovation policies for transformative change: Combining insights from innovation systems and multi-level perspective in a comprehensive 'failures' framework. **Research Policy**, v. 41, n. 6, p. 1037-1047, 2012.

WORLD CANCER RESEARCH FUND/AMERICAN INSTITUTE FOR CANCER RESEARCH. **Food, Nutrition, Physical Activity, and the Prevention of Cancer: A Global Perspective**. Washington, DC: AICR, 2007.

WORLD CANCER RESEARCH FUND. **"Once-in-generation" chance for 2.8 million preventable cancers. 2011**. Available in: <http://www.wcrf-uk.org/audience/media/press_release.php?recid=162>. Accessed on: 21 may 2013.

_____. **Red and Processed Meats and Cancer Prevention**. London: WCRF, UK, 2013. Available in: <http://www.wcrf-uk.org/cancer_prevention/recommendations/meat_and_cancer.php>. Accessed on: 21 may 2013.

WORLD HEALTH ORGANISATION. **Diet, Nutrition and the Prevention of Chronic Diseases**. Geneva, Switzerland: WHO, 2003.

YOTOPOULOS, P. A. Middle-income classes and food crises: the 'new' food-feed competition. **Economic Development and Cultural Change**, v. 33, n. 3, p. 463-483, 1985.