The Irvine Atlas

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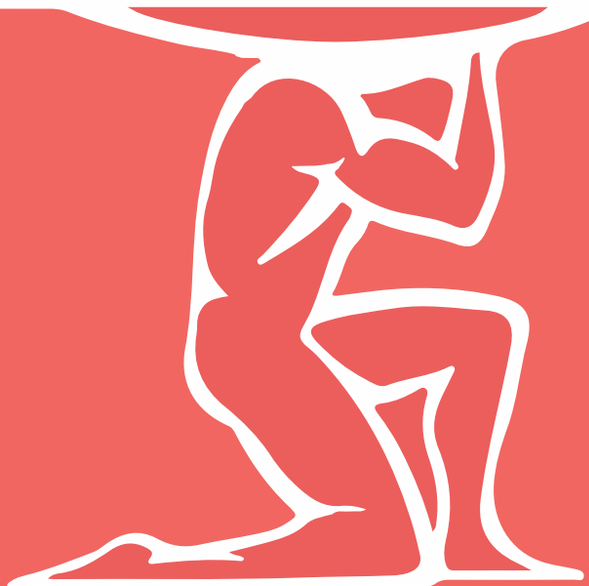

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Note from the Editors

We bring this issue of The Irvine Atlas to you at what is a rather complicated and tense time across the globe. In the few months leading up to the issue's publication, we have seen our editorial team, our friends and our colleagues struggle to navigate the new social landscape carved out by the Covid-19 pandemic. This is a struggle which continues on, this note itself being written in two separate places across Scotland - West Kilbride and the Isle of Arran. We sit in isolation, reflecting on the progress of this journal over the past year.

This issue was made with hard-work, determination, and an abundance of interesting articles, as with all the previous editions. However, unlike them, the latter half of our editorial process was completed by committee members and authors, locked down in different places all across the globe (with thanks to modern technology). This is a testament to the resilience, dedication and high-standard of work produced by our editorial team and contributing authors. It would have been easy to let the stress and uncertainty of this time cloud our need to complete this journal, but we worked together and continued on. It is sad that there will be no formal celebration in St Andrews or a chance to flip through the freshly printed pages of this issue, but we encourage all of the contributors to this issue to take pride in the work we have accomplished.

The Irvine Atlas has been a large part of our lives, and with our well wishes, we are excited to see where it goes over the next few years as we pass the torch on to next year's committee.

Abbie Lily Fairclough and Imogen Anne Armstrong
Co-Editors in Chief

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The Racialised Discourse surrounding Coronavirus: An Interview with Dr Lynteris

Abbie Fairclough (Fourth Year) and Charlotte Evans (Second Year)

*In conversation with **Abbie Fairclough** (Editor-in-Chief) and **Charlotte Evans** (Human Geography Editor), **Dr. Christos Lynteris** discusses discourses of race, securitisation, and the notion of existential threat that the novel Coronavirus may pose…*

Dr Lynteris is a medical anthropologist, specialising in the social and historical dimensions of disease epidemics and *zoonosis*: animal to human infection. He completed his Undergraduate and Postgraduate study at the University of St. Andrews, with a PhD on the anthropology of public health and the epidemiological restructuring of China after the SARS outbreak in 2003. His focus then shifted to the bubonic plague, with Postdoctoral study at the University of Cambridge focusing on how people in Mongolia and South Siberia protected themselves from the plague and a European Research Council Starting Grant project on the visual representations of the third plague pandemic. He joined St Andrews's Department of Social Anthropology in 2017, and his current 5-year project, funded by the Wellcome Trust, is on the global war against rats and the epistemic emergence of zoonosis. We meet Dr Lynteris at a time when zoonotic disease is a very topical issue - as Covid-19 sweeps the globe.

With the speed at which the Covid-19 outbreak is changing our social landscape, it is worth mentioning the temporal context of this interview and its write up. The interview was conducted on the 4th of March, when the outbreak of Covid-19 was very much in the public consciousness but had not yet reached pandemic proportions. This was also prior to lockdown measures being implemented in the UK. It was written up in the weeks following, up until its last revision on the 7th April.

Dr Lynteris began by explaining that his work focused on infectious zoonotic epidemics including research in China alongside the Centre for Disease Control (CDC), which emerged after the SARS outbreak. It is unsurprising that media such as the New York Times, have reached out to Dr Lynteris for his expertise during this present Coronavirus pandemic. Dr Lynteris' present project on the "epistemological building blocks" for understanding zoonotic diseases, explores the ways in which a disease vector can become a 'zoonotic villain' in the public eye. His project takes the "global war against the rat" as the foundation on which epidemiological reasoning (the way we think about epidemics) developed. He referred to the rat as a "charismatic zoonotic villain which preoccupied the entire globe" in the first half of the 20th Century, showing how public perceptions of disease vectors can have societal, even global, implications. "The moment when they realised that rats spread plague and other diseases. Everyone became obsessed with rats. So across the globe there was the biggest campaign against any animal vector we've ever known. And that contributed to the basic understandings, the very language of zoonotic diseases we have today".

When it comes to Covid-19 however, the 'zoonotic villain' is not so clear. As Dr Lynteris pointed out, although the genome of the disease suggests that it is a zoonotic disease, the main reservoir of Covid-19 is uncertain (though bats are the likely culprit). On top of this, the intermediary host is, as of yet, undetermined. This ongoing search for the animal vector responsible comes at an opportune, albeit unfortunate, time as Lynteris' recently published book 'Framing Animals as Epidemic Villains: Histories of Non-Human Disease Vectors' covers this phenomenon in great detail[1].

Despite the fact that little has been scientifically proven about the origin of this disease, many popular media platforms have strongly implicated Wuhan's 'wet markets' as the location in which the virus was contracted. We asked Dr Lynteris if the scientific community share this assumption. "Well this is no longer the assumption. The latest scientific data show that the outbreak started outside in a different place, not in the market," he told us. "The fact that we have found the virus in the wet market doesn't mean that it emerged there...So the problem here is that we expect wet markets to be these incubators of disease emergence so that we immediately look at them to find it and that blinds us to all other possibilities." The particular market referenced

1 Lynteris, C. (2019). Framing Animals as Epidemic Villains: Histories of Non-Human Disease Vectors. London: Palgrave MacMillan.

here is the Huanan Seafood and Wholesale market, which was initially implicated as the site of origin of the disease. It was later determined however that it was likely only a location in which the virus was spread between humans rather than being the original source[2].

So why have various media fixated on the idea that the Covid-19 outbreak originated in Wuhan's wet markets? Dr Lynteris explained, "The media love wet markets because they can exoticise them, they can orientalise them...I mean 'wet markets' is in itself a very problematic term because it encompasses so many things that it's actually meaningless. The term 'wet market' encompasses anything from a market where freshly butchered meat is sold...to markets of poached wild animals."

Not only is the term 'wet market' homogenising to the point of being effectively meaningless, but the association of these markets with disease and uncleanliness is inaccurate. As Dr Lynteris clarified, "In my field work with the China CDC, we inspected wet markets all the time and these are perfectly legitimate and legal markets." He went on to describe how markets are frequently inspected and sanitised with laws, regulations and sanitary officers monitoring the process. "It's not marginal, illegal, shady... as it's portrayed in the West. It's THE market, it's the normal market." In fact, in cities such as Shanghai, he mentioned, lower and middle classes rely on these markets to provide up to 60% of their weekly groceries[3].

Lynteris continued on to say that it is of course true that illegal, or less well monitored activities may take place on the margins of these markets but that this is true of any country as vast as China. He also criticised certain journalists' claims of "*exotic* animals being sold and eaten in China". Using the example of frogs, he dryly joked, "well probably the same journalist goes to France and eats frog legs and pays a fortune for them but when it's in China then it's a problem." This type of xenophobic trope, Dr Lynteris says, has been pervasive since the 19th century and is "one of the constitutive elements of xenophobia." Xenophobia like this, he says, is incredibly normalised in the West.

Uncertainty is present not only in the search for the origin of the virus, but also in the process of developing appropriate responses to the Covid-19 pandemic. International border controls and securitisation have been high up on the priorities of many states in their attempts to quell the spread of the virus, but is this response an effective one? The usual method of border checks involves the use of thermal cameras to check passengers for fever symptoms. With many infected people showing little to no symptoms of fever, Dr Lynteris doubts the effectiveness of these checks which he called "notoriously inaccurate". Not only do they miss asymptomatic infected people, but they also produce many false positives, with individuals displaying fever symptoms for reasons separate from the novel coronavirus.

He critiqued this biosecurity model of preparedness further, saying, "What is the point of overstretching a system which needs to dedicate its resources to containing this virus? You have a system with limited resources. Where are you going to allocate them? You can allocate them at the borders where they're going to produce many false positives and miss most of the cases, creating a false sense of security and stretching your resources, or you can place these resources in primary health care. What do we really need?...Well, always the answer is we need more nurses and doctors."

On the other hand, Dr Lynteris commended the community containment measures which have been seen across the globe, "Ultimately in all cases of epidemics and pandemics, we rely on quarantine and isolation. These are the big tools we have. They're 15th century tools, they have nothing to do, per se, with bacteriology or modern understandings of medicine. These are the inheritance of pre-bacteriological understandings of disease and yet they have adapted to bacteriological understandings and virological understandings of disease and they're very efficient. They're the only things that are efficient in the absence of vaccinations or actual cures, which we have neither for this disease."

The question is, how far you take this. When we spoke to Dr Lynteris, Wuhan was still in lockdown but the UK had yet to impose lockdown measures, and the outbreak had not yet been declared a pandemic. "When do you decide that people have to lockdown, like they did in China? Frankly, the reason that this disease, this outbreak, has not yet taken pandemic proportions is because China took these draconian measures." Dr Lynteris

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2 Huang, C. et al. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. The Lancet. 395(10223). pp.497-506.
3 Maruyama, M., Wu, L., and Huang, L. (2016) The modernization of fresh food retailing in China: The role of consumers. Journal of Retailing and Consumer Services. 30. pp.33-39.

said that he believed that the Chinese lockdown was "absolutely necessary" given the timing of Chinese New Year generating mass internal travel. In a time of crisis, complicated questions arise surrounding the value of democracy and the simultaneous requisite for emergency powers to be implemented. The question of which actions are appropriate to take, is always context dependent. Dr Lynteris explained how China had the political, logistical, and ideological capacity to act as they did, "They had the power to say, 'No, we're locking down'." This power also enabled the state to enforce closures on certain companies and factories, and redirect industries to ensure basic provisions were met. Ideologically, "the capacity of a police state where if you didn't do that, there were enormous penalties of imprisonment" ensured conformity. But Dr Lynteris also warned against being so simplistic. "We must realise that there is a hegemonic capacity as well, there was a degree of consensus, that people did believe that this is the best way. It's a combination of people being afraid to do otherwise and people believing".

Moving the discussion on from governance of the response, to the media reaction, we asked Dr Lynteris if he thought that the general discourse surrounding Coronavirus was over-sensationalised, or whether it was appropriate to the level of risk. He sighed, stating that the media went from ignoring it, "to freaking out". We added that some of the headlines we had seen were quite extreme - racialised and apocalyptic: "That's kind of the problem of the media". He mentioned "unbelievably bad stories", conspiracy theories, rife with xenophobia. On the other hand, he noted that some media have shown a "genuine interest in engaging with social scientists". Dr Lynteris himself was facing the tough deadlines and sleepless nights involved with meeting article or interview requests. He works to ensure that "critical, social-scientific approaches" also reach the public.

We asked him whether the scientific community has a responsibility in controlling that reaction to the epidemic and disproving some of those media suggestions; he believes so. "When we spot these inaccuracies or fake news or complete misreadings of a situation, I think we have the responsibility to intervene, absolutely. If not, we're failing in our vocation, in our duties, in everything". He added that working to combat stigmatisation is one of the most important areas within this.

Dr Lynteris says that stigmatisation "has been a side effect of epidemic containment and control throughout history". The WHO stresses that we must ensure that policies do not lead to stigmatisation, which Dr Lynteris called "an epidemic in itself". But alongside these perennial reactions, he referred to the "horrible new phenomenon of people calling people of Asian origin 'viruses'". This "metonymic operation" has become widespread across the Western world, and Dr Lynteris believes it is the first time that stigmatisation has taken this form - identifying people of a certain race as the virus itself.

Finally, we looked at two different geographical scales of the crisis, asking Dr. Lynteris to what extent he thought that the novel Coronavirus was a significant threat to us here in the UK, or an 'existential risk' to humanity. "Existential risk is one of my favourite things!" Dr Lynteris quipped before going on to say more sternly, "of course it's a risk to the UK and we're going to see this in the coming weeks. It depends how the UK handles it". He was also certain that Covid-19 would come to St Andrews: "We're not an island… It's likely to go anywhere where there are a lot of people travelling and visiting, and university towns are very active and very cosmopolitan places, which is a great thing, but of course this means that it's likely". At the time of writing, Dr Lynteris' prediction has already come true; on the 7th April the last recorded number of confirmed Covid-19 cases in the UK reached over 55,000[4], and the first positive case was confirmed in St Andrews on the 13th March[5].

However, Dr. Lynteris explained that what is more important is how communities respond to prevent inter-community transmission. In headline news, the British Government provided advice on hygiene and social distancing, but their policy of 'herd immunity' came into question by political leaders and the WHO and was later dismissed. Since then, lockdown measures have been imposed however the question still remains: should a harder

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4 Clarke, S., and Gutiérrez, P., (2020). "Coronavirus UK: how many confirmed cases are in your area?", The Guardian. [Online] Available at: https://www.theguardian.com/world/2020/apr/07/coronavirus-uk-how-many-confirmed-cases-are-in-your-area-covid-19-map (Accessed 7 April 2020).

5 BBC (2020). "St Andrews confirms case of Covid-19", BBC News, Scotland. [Online] Available at: https://www.bbc.co.uk/news/uk-scotland-edinburgh-east-fife-51872202 (Accessed 16 March 2020).

line be taken to prevent community transmission? With great uncertainty, and the crisis unfolding so rapidly, the answers to such politically charged questions will only be visible in the months to come.

Dr Lynteris ended by returning to existential risk, bringing out '*Human Extinction and the Pandemic Imaginary*[6]' - "a timely publication again unfortunately". Referring to Covid-19, he said that "rather than asking whether this is an existential risk, the more interesting question is to ask how this plays into this imagination of pandemics as leading, or potentially leading to human extinction". We asked whether he thought that this remained an imaginary, or was becoming a genuine real threat, to which he replied: "I don't think that imaginaries are not real… they always rely on something of reality."

Returning to a historical dimension of disease, Dr. Lynteris explained that "of course pandemics can lead to population collapses", but rather than questioning the possibility of societal collapse, Dr Lynteris is questioning "how this is informing the way in which we think of ourselves as humans and our relation to the world."

He went on to expand on this saying, "Most of the stories we tell ourselves about pandemics and the end of the world are not really the scientific stories, which are very complex". Instead, "They're very simplified stories... which portray an end of the world which is very problematic because it always shows a virus coming from the non-Western world, usually from a jungle or from the 'wilderness'". These representations of disease lead to "a re-tropicalisation of the world [where] nature is waiting for this virus to liberate itself from humanity". Dr. Lynteris wondered why we imagine this future fate to be the case. Perhaps because "the only way in which we imagine humanity is a humanity which is in a relation of mastery to nature. We cannot imagine humans coexisting with the natural world in any other way other than being masters of it… all these anxieties, the existential risk anxieties, are because our imagination of the pandemic end of the world is a world where we will have lost mastery of the world. And this really frightens us, and I think we really need to start dealing with this anxiety".

Having thanked him for a fascinating interview, we left Dr Lynteris' office with plenty of food for thought; intrigued by the ethical, political, geographical, and existential questions that arose from the discussion, and concerned for the fate of our own world. For the mutual benefit of people and planet, humanity needs to find "other ways of interacting with a non-human world other than domination and mastery".

6 Lynteris, C. (2020) Human extinction and the pandemic imaginary. New York: Routledge.

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Poverty and HIV/AIDS: A Fundamental Connection

Jordan White (Fourth Year, Geography and International Relations)

***Abstract* – The severity of the HIV/AIDS crisis has led many in the worlds of policy and academia to examine the disease and the conditions under which it thrives. However, Geographers have largely fallen behind on this trend. This article seeks to fill this gap. It is important for the discipline to engage with this field because Geography can provide a unique perspective on the contextual conditions, or the terrain, under which the disease thrives. This piece seeks to examine the terrain of poverty, and its effects on the prevalence of the disease in an African context. It will draw an explicit link between the damaging impact of poverty on the spread of HIV, as well as the quality of life of those living with the illness. Finally, it will recommend that more attention should be paid to the link between the two issues for the HIV crisis to be adequately tackled.**

Introduction

The HIV/AIDS crisis is perhaps the most prominent public health crisis of the modern era (Whiteside, 2002, p.313). Since the 1980s, continued coverage of the spread of the virus has forced the issue into public consciousness and onto the radar of academics. Discourse has focused disproportionately on transmission and individual risk (Caldwell, Caldwell & Quiggin, 1989, pp.218-220), rather than the wider socio-economic and cultural conditions under which it has tended to thrive. This has left a gap in academic literature and policy responses, which focus on issues like safe sex (through the distribution of barrier contraceptives) and the distribution of antiretroviral (ARV) drugs, rather than tackling the environmental/social/structural factors associated with the epidemic that disproportionally affect some of the poorest in the world. This essay will focus on the effect of poverty on the spread of HIV/AIDS, and on the harmful effect that it has on those who are already living with it, focussing on sub-Saharan Africa. It is based on the following assumptions:

1. A connection exists between poverty and the spread of HIV/AIDS.

2. Poverty has a tangible effect on the way people who have HIV/AIDS live their lives.

3. Economic status is the single biggest determinative factor for the way people live their lives on a day-to-day basis, and consequently how they deal with HIV pre- and post-infection.

The biological side of HIV/AIDS is important to understand. However, context is extremely important.

Context/Epidemiology

Human immunodeficiency Virus (HIV) is a disease that attacks the immune system and leaves one vulnerable to opportunistic infections that may become life threatening (NHS website – 'Overview: HIV and AIDS', 2018). It is the direct cause of Acquired Immune Deficiency Syndrome (AIDS) (Poku, 2001, p.191), a condition of 'a number of potentially life-threatening infections and illnesses' that will develop if HIV is not treated (NHS website – 'Overview: HIV and AIDS', 2018). Infection rates began to gather pace throughout the late 20th century, and the disease began to gain public attention, along with social stigma. HIV has been called a 'gay' and an African disease (Craddock, 2004, p.160), despite the fact that anyone can contract it. It is transmitted through bodily fluids (blood, seminal/vaginal/anal fluid, and breast milk), with the most common mode of transmission being unprotected sexual intercourse (NHS website – 'Overview: HIV and AIDS', 2018). HIV is often undetectable to someone who has contracted it, due to its long period of minimal, or no, symptoms (NHS website – 'Overview: HIV and AIDS', 2018). This makes it more dangerous, as it is much more likely that someone will pass on the virus if they are unaware that they have it (Cohen, 2006, p.2).

The US bureau of statistics estimated there were 38 million people worldwide living with HIV/AIDS in 2018, with an estimated additional 1.7 million infected that year (US Government HIV.gov website – 'The Global AIDS epidemic', 2019). The number of AIDS-related deaths stood at nearly 800,000 in 2018 (US Government HIV.gov website – 'The Global AIDS epidemic', 2019). There remains no cure for the disease. HIV/AIDS has a geographical concentration in Africa, with 25 million patients out of the worldwide total of 38 million in 2018 (WHO website – 'HIV/AIDS')This is no coincidence, nor is it merely the result of the fact that the disease originated there. Rather, it is a result of specific contextual and structural factors, the most important of which is poverty, which transcend scales from international to local and individual levels. This means that there are 'spatial implications of living with AIDS' depending on where you live in the world, 'characterized by regional coordinates of risk and vulnerability' (Cra-

ddock, 2004, p.153). Africa is especially vulnerable because it remains the poorest continent in the world (SOS Children's Villages website – 'Poverty in Africa')., and poverty is inherently linked to vulnerability.

Conceptualising poverty

Poverty is a complex phenomenon, and a firm definition of it remains elusive (Corbridge, 2009). This essay is more concerned with the non-material implications of poverty. It is financial (a lack of monetary resources/assets), but it also manifests itself in ways that rob those who are afflicted with it of agency and power, and leaves people vulnerable (Bohle & Watts, 1993, pp.117-119), causing "social exclusion" from wider society (Corbridge, 2009), as well as stigmatisation and discrimination in both popular discourse and the policy realm. This causes a "range of key human attributes, including health", to be undermined (WHO regional office for Africa website – 'Health topic: poverty'), thus negatively impacting those who are at risk of contracting, or have already contracted, HIV/AIDS.

The causes of poverty are also widely debated. They become apparent at various levels of analysis, from the international/systemic level to the level on the individual. In an African context, systemic and nation-state level factors can be blamed for a large portion of economic strife, much of which is related to globalisation and neoliberal economics (Amin, 2002, pp.387-389). For example, Structural Adjustment Programmes and harsh loan conditions, which include conditions of fiscal responsibility (leading to a lack of public spending on areas like healthcare), mean that countries have been financially unable to respond to crises like HIV/AIDS (Poku, 2001, p.200). Structural factors are outside of the control of individuals. This 'poverty trap' negates the assumption that people will eventually accumulate enough assets and savings to climb out of poverty, and instead ensures that the number of poor people remains the same or increases (Barrett & Carter, 2006, p.185). Thus, prevailing international economic conditions have greatly disadvantaged the continent.

African states have less capital than Western counterparts to invest in health infrastructure (modern, equipped hospitals and clinics and widespread ARV treatment) and education programmes around sexual health. This means that communities and individuals are lacking in support and public services. It also means a lack of access to opportunities of self-advancement (WHO regional office for Africa website – 'Health topic: poverty'). As a result of inherent social exclusion, the poorest in society feel these affects most acutely. Being African is not synonymous with being poor. However, structural inequality and the lack of a social safety net means that many on the continent get left behind.

Poverty causes the spread of HIV/AIDS

'Poverty and disempowerment have played central roles in the transmission of HIV in sub-Saharan Africa', says Susan Craddock (2004, p.156). A lack of material resources restricts free will and may trap individuals within particular courses of action. This is not to suggest that the poor do not have agency, but rather that agency is circumscribed based on circumstances. Being poor also means being more vulnerable, which means that poor people are more susceptible to and less able to cope with threats such as war, natural disaster, and infectious disease (Bohle & Watts, 1993, pp.117-118). This has especially damaging consequences for the HIV epidemic, evidenced by the fact that HIV infections are much higher amongst the poor and marginalised (Whiteside, 2002, p.314).

One consequence of being marginalised is that education programmes aimed at preventing the spread of communicable diseases like HIV do not reach the poorest in society (Cohen, 2006, p.2). This contributes to a lack of awareness about the risks of certain sexual behaviours, such as unprotected intercourse. While concerted efforts have been made to change sexual behaviours and attitudes, these programmes have not been carried out equitably and the poor are the most likely to be excluded (Cohen, 2006, p.2). Additionally, the risks that the poor and marginalised face in their daily lives mean that the longer-term risks posed by sexually transmitted diseases are of a lesser concern – 'for the poor, the here and now is what matters' (Cohen, 2006, p.2). Because of the lack of information that is distributed to the poor and this day-to-day survival attitude obscuring long-term health concerns, the poor are more likely to expose themselves to risky sexual behaviour (Poku, 2001, pp.195-196). HIV/AIDS prevention programmes have tended to be blanket policies, not adapted to specific localised contexts or geared towards certain socio-economic groups. Instead, a discourse of 'risk groups' is employed (Craddock, 2004, p.153), which leads to stigmatisation instead of getting to the root of the problem.

Risky behaviour may be attributed to a challenging, even desperate, context. Two of the most commonly referenced examples of how poverty causes risk are as follows. First, labour mobility means that workers (mostly young men) are separated from fam-

ily/community structures, as well as the constraints of traditional attitudes (Poku, 2001, pp.195-196). The most well-known example of this is in mines in South Africa, where male workers from poor backgrounds do backbreaking, dangerous labour for poor wages and live in poor quality all-male housing with few sources of entertainment (Fassin & Schneider, 2003). They may feel a sense of freedom being away from home, which often translates into sexual freedom. Monotonous work and all-male quarters mean that there are few other sources of entertainment and gratification (Fassin & Schneider, 2003). Being away from home for long periods will increase the likelihood that they solicit commercial sex workers or 'sleep around', thereby exposing themselves to risk (Craddock, 2004, p.157). Furthermore, they may then return home and transmit the virus to people in their communities (Craddock, 2004, pp.156-157).

A second example is commercial sex. Women in desperate positions, who feel normative societal pressure to provide for their families and financial pressure, may be encouraged to enter the commercial sex trade, or to engage in occasional commercial sex transactions, as "survival strategies for themselves and their dependents" (Poku, 2001, p.196). Whilst desperation need not be a factor, it cannot be discounted as a possible cause. Societal conditions and prevailing attitudes give women little freedom to search for other means to provide for themselves and their families, so they are forced into a position of being reliant on men (Craddock, 2004, p.156). Again, this is not to discount the role of agency, but many women feel that they are left with little choice (Craddock, 2004, p.156). This is also linked to the prevalence of 'sugar daddies' in many societies, whereby young girls engage in sexual activities with older men in return for financial rewards and security (Caldwell et al.,1989, pp.203-204). These behaviours inevitably expose women to greater risks from sexually transmitted infections, especially if prevailing power dynamics prevent them from negotiating safe sex practices (Craddock, 2004, p.159), for fear of being deprived of essential financial support. This gendered reliance is indicative of a broader vulnerability in poor settings, whereby women are financially reliant on working men. Thus, poverty and sexual relations are also highly gendered, which exposes women to more risks from HIV/AIDS due to lack of control and sexual freedom (Poku, 2001, pp.196-197).

Poverty affects people living with HIV/AIDS. A lack of power, circumscribed agency, and social exclusion also have a tangible impact upon those who are already living with the disease. Conditions of poverty mean that one is statistically more likely to contract other infectious diseases (Piwoz & Preble, 2000, p.4). This can be compounded by a lack of clean water and poor food hygiene practices (US Department of Health and Human Services Website – 'AIDS info', 2019). Illness can be especially harmful to people living with HIV, as these opportunistic infections take advantage of a weakened immune system and cause severe illness more frequently. The poor are also less financially able to access both antiretroviral treatment and other drugs to treat HIV/AIDS related complications (Piwoz & Preble, 2000, pp.39-40), making the disease more deadly. Additionally, transport to-and-from medical facilities is an expense many cannot afford (Poku, 2001, p.196), so even if governments provided free medication, many of those worst affected would not be able to access it.

Poverty has been correlated with malnutrition (Bohle & Watts, 1993, pp.117-118), which can be particularly harmful to people with HIV/AIDS (Piwoz & Preble, 2000, p.6). Malnutrition, especially micronutrient malnutrition (a lack of essential vitamins and minerals) can damage one's immune system even further and reduce the body's ability to cope with ARV treatment, thus compounding the effects of the disease and accelerating the onset of infections associated with AIDS (Piwoz & Preble, 2000, pp.5-6). A combination of the two can also increase the pace of weight loss and 'muscle wasting', whereby HIV/AIDS causes rapid loss of muscle mass (Piwoz & Preble, 2000, pp.9-11). A harmful cycle ensues whereby HIV/AIDS causes weight loss and weight loss compounds the harmful effects of HIV/AIDS, a cycle which can only be broken by strict adherence to a healthy and varied diet and expensive treatments that increase appetite and rectify chemical imbalances (Piwoz & Preble, 2000, pp.11-12). These options are not conceivable for the poor. This means that they are excluded from the most effective ways to treat HIV/AIDS-related nutritional issues.

The issues of living with HIV/AIDS are compounded by its geographical tendencies to cluster in particular communities and family units (Poku, 2001, p.196), mostly in poor areas where transmission occurs more rapidly. This means that multiple members of the same family, or whole working-age populations within a community, may be struck down by illness, thereby depriving a unit (at various scales) of sources of income and support (Cohen, 2006, p.3). Additionally, poor communities and families are less able to cope with this shock and 'lack savings and other assets which can cushion the impact of illness and death' (Cohen, 2006, p.3). The long-term nature of the

illness means that increasingly frequent periods of ill health can lead to the prolonging of these conditions, which can cause long-term economic impacts that families and communities may never recover from (Cohen, 2006, p.3). Additionally, if a large portion of the community is incapacitated by illness, then that community may become rapidly impoverished. Thus, whilst a lack of ability to cope may be caused by conditions of poverty, the illness itself further impoverishes families and communities (Poku, 2001, pp.196-197). At a national scale, if a large proportion of the working-age population is incapacitated or killed by HIV/AIDS related illnesses, and yet more people are unable to work because they have to care for the sick, then this will likely have drastic implications on the country's economy. It becomes clear that poverty will increase at all levels, and the cycle will begin again.

Conclusion

The connection between HIV/AIDS and poverty is clear. It has both an impact on the rate and chances of infection and the ability of infected people to live long and healthy lives. In fact, poverty related factors are the single biggest determinative factor for the quality of life of infected persons, and one of, if not the, biggest factor in the transmission of the virus. Thus, responses need to distance themselves from individual discourses of blame and focus on much more than sexual practices to prevent the spread of the disease. This means large scale poverty alleviation that focusses on bottom-up measures that actually help the poor. The research community and policymakers must adopt a poverty-centric view of HIV/AIDS and formulate responses based on this connection to truly tackle the scourge of the disease. If this does not happen, the consequences will continue to be dire.

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The Gendered Spaces of Pregnancy

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Abstract – **Looking at the placement of gendered bodies into separate abstract notions of space this essay explores the paradoxical nature of bodies. Firstly, they exist in space. Using the pregnant body to illustrate these ideas, I consider how, despite women's increasing involvement within the public sphere, that the female body is expected to follow strict conditions for existing within the masculine 'public' sphere. I then go on to consider the other side of the paradox; not only do bodies exist within space but they are themselves spaces. The boundary between self and other is constantly fluid and this is particularly interesting in pregnancy, in which a physical part of the female body is, to a large extent, put under the control of the public. This essay ends by considering how spaces of knowledge are masculinised resulting in physical effects on the female body.**

The historically masculinist production of knowledge has resulted in the geography of gender largely being excluded from the academy. Although feminist theorists have succeeded in bringing the concept of gender to the forefront of geographic thinking, for a time they saw women as the 'prisoners of their bodies' in need of transcending them. Thus, the body's role was largely ignored (Longhurst, 2005, p.338). Looking to deconstruct the dominant Cartesian separation of mind and body, the interest in bodies has increased over the years. They are now generally seen as paradoxical; they "exist in place and at the same time they are places." (McDowell cited in Longhurst, 2005, p.337). This essay will consider how discourses of gender construct and control gendered bodies, resulting in the Man being separated into public space and the Woman into private space. I will demonstrate how these notions vary spatially and also how geographic boundaries are more fluid than they are fixed. To illustrate and explain these concepts I will be using literature surrounding pregnant women as, 'it is at the juncture when the corporeal body is manifestly female…that it is most excluded from geography' (Madge et al., n.d., p.69). In this sense I see pregnancy as being the heightened form of 'femininity'.

For the purposes of this essay I will take the definition of gender as the specific characteristics assigned to the sexes of male and female, but I will also consider Judith Butler's performative notion of gender (Butler, 1990). Whilst I acknowledge that gender is a spectrum, given that the essay focuses on pregnancy, which is inherently tied to the female sex, I will only be considering the binary notion of gender. It is important to note that this essay will be discussed using Western, advanced industrial societies and furthermore, considers only briefly the interlocking mechanisms tied to gender such as race which I recognise as being important.

It is necessary to first discuss the discourses that construct the ideas of gender before looking at its relation to geography. Although spatially and temporally distinct, in the West there is traditionally a dominant discourse on gender of the Cartesian split between 'the abstract, rational, cultural Man' and the 'embodied, emotional, natural Woman' (Longhurst, 2000, p.462). Women are restricted to the confines of their body whereas men are able to transcend theirs. Through this embodiment the woman is objectified. Jacqueline Chase offers that, 'female landscape metaphors enabled a double exploitation which included naturalising women and their bodies and using nature in ways which are similar to the exploitative use of women's bodies' (Chase, 2001, pp.184-185). By presenting 'biology, nature and essential differences that exist between men and women' as the reasoning for the differing gendered behaviours it becomes very difficult to destabilise this discourse (Longhurst, 2000, p.461). These discourses, whilst geographic in themselves, place the Man into the public sphere and the Woman into the private sphere.

Robyn Longhurst shows, through the example of the positive birthing movements, how the discourses of gender push women to exist in a separate space to that of the 'Man'; a space 'outside of culture' (Longhurst, 2000, p.462). These movements attempt to escape the intense medicalisation of pregnancy and the specific masculinised sphere that exists within it, by emphasising pregnancy as 'natural'. At first, I was unconvinced of Longhurst's issues surrounding this; pregnancy is surely the most natural thing a human can do? In fact, I would argue, in reinforcing pregnancy as 'natural', the movements serve to emphasise the Cartesian split of gender discourses which lead to the separation of gender in space. Longhurst, however, shows how, 'the discourse of natural childbirth carries with it a tendency to compare pregnant women with animals' (Longhurst, 2000, p.462). As animals are generally considered 'to exist outside of culture' the result is the projection of women to exist in a separate space, 'removed' from the 'rational', 'cultural'

space that is inhabited by men. By removing bodies from 'culture' it serves to ignore the spatiality and temporality associated with gender. Therefore, in giving an abstract space to each binary notion of gender, it serves to present gender as having no material geography. The previously masculinised production of geographical knowledge therefore led to the ignorance of the gendered divisions of geography. I found it interesting therefore that in Iris Marion Young's Pregnant Embodiment she says, [pregnancy] roots me in the earth' (Young, 2005, p.52). In Justice and Politics Young argues that, 'Perhaps such differences should not exist but without doubt they do. Ignoring these differences sometimes disadvantages women in public settings where masculine norms and styles predominate.' (Young, 1990, p.176). To an extent I agree with this, although controversial, I do not see what is to be gained in the study of gender if it does not work in some way to aid in the emancipation of people. Considering such abstract notions of the geography of gender does not help lived experiences.

In 1986 Davis-Floyd argued that pregnant women are no longer confined to the private sphere, that they 'have come out of the closet' and that we now see pregnant women everywhere, indicating the temporal and geographic variability to gender (Davis-Floyd cited in Longhurst, 2000, p.458). 'Women have had access to public spaces' for about a century, yet this access has strict limitations – women must hide their 'gender' such as their 'emotionality' (Young, 1990, p.120). Furthermore, Longhurst shows with her work with midwives and pregnant women in Aotearoa/New Zealand, that pregnant women tend to withdraw into the private sphere due to their 'feminine' trait of 'irrationality' and 'emotionality' which is supposedly heightened during pregnancy (Longhurst, 1997, pp.35-36). I would suggest therefore that rather than a total form of emancipation, that the borders between public and private have become blurred where they were once seen as very separate.

The classic example of this is Longhurst's famous article 'Corpeographies' of Pregnancy: 'Bikini Babes', written over a decade after women supposedly 'came out the closet'. The discussion is centred around the image in Figure 1. of five pregnant women walking in Wellington, Aotearoa/New Zealand as part of a radio show contest. (Longhurst, 2000). This image is the perfect example of boundaries blurring with the supposed 'private space' of the pregnant woman visibly shown in the public sphere. Women's bodies are projected as the 'Other' to the male body, and therefore they are viewed upon in public space with a 'gaze' which acts to police women. (Young, 1980, p.44). After the publication of this image the station received many complaints concerning the women's violation of social norms. Longhurst reads these letters as the public's 'attempt to police the boundaries of pregnant women' and to warn others 'against acting improperly in public space'. (Longhurst, 2000, p.463) Longhurst uses Butler's performative gender in her analysis to show how gender is created through 'repeated stylisation of the body' (Butler, 1990, p.33). Lise Nelson critiques Butler's work given it is 'abstracted from personal lived history as well as from its historical and geographical embeddedness' (Nelson, 1999, p.332). What I appreciate about Longhurst's work, therefore, is that it moves away from this abstracted subject and focuses on the lived experiences of women.

Figure 1: 'The bikini babes' (Longhurst, 2000)

The ideas presented show there is a geography to gender through the separation of femininity and masculinity into the private and public sphere but also how this is spatially and temporally dependent. The discourse of the 'emotional' woman, according to Chavkin, puts at stake women's 'autonomy, bodily integrity and constitutional status', legitimising the control of the body through its objectification and thus causing them to withdraw from public space (Chavkin, 1992). It is important to note that women are involved in reinforcing these discourses themselves. In the example of the 'Bikini Babes', some of those that contacted the station were themselves pregnant and 'argued that pregnancy was a private matter that did not belong in the public realm' (Longhurst, 2000, p.458). Again, however, these notions are highly spatial and temporal. Longhurst argues these behaviours are performative, but she says the point is not to deny the effect of hormones and endorphins but to show 'biologism can [also] serve to simplify or make natural what are often complex social and cultural processes' (Madge et al., n.d., p.74).

The gendered body also has a geography. The

presentation of women's bodies as 'weak' serves to project the body as vulnerable and therefore open to intrusion. As Young writes, 'she…lives the threat of invasion of her body space… it is acceptable… for women to be touched in ways and under circumstances that it is not acceptable for men to be touched' (Young, 1980, p.154). Her spatiality is subject to much greater control than men's. This, therefore, suggests further the fluidity of the boundaries between public and private; the woman knows where her geographic space ends yet is constantly finding it 'penetrated'. This is exaggerated in pregnancy, in which the site of the body has both a place that is part of the woman and a place separate from her: an 'Other'. Madge et al. describe this perfectly: 'The dichotomy of inside/outside was disrupted and boundaries became blurred and fuzzy as my babies were both a part of me and apart from me.' (Madge et al., n.d., p.68).

There is a fluidity in the boundary between where their physical space is believed to be and where it materially is. Kristeva believes, therefore, that the pregnant woman 'is simply the site of her own proceedings' (Kristeva, 1980, p.237). In confining women to this space, bodily control is given to the masculinised public and the pregnant woman finds her physical space penetrated more often. A respondent for Longhurst's work highlights that, '"Sometimes I feel as though being pregnant automatically deprives me of any individual identity and personal space… because I've got a `bump' it seems that I've become public property"' (Longhurst, 2000, p.468).

I would argue that to an extent there has been a movement away from viewing the woman as merely a 'container' for the foetus (Young, 2005, p.46). The positive birthing movement, for example, emphasises the importance of the woman in the pregnancy and works to deconstruct the discourses of women as 'weak' and 'irrational'. Thus, giving some power for the control of her boundaries back to the woman. This highlights the temporal and spatial variations in discourses of gender.

The production of knowledge has traditionally been a masculine undertaking, which fetishized the objective and the visual (Harraway, 1988). Although feminist and other critical theorists have shown the importance of the subjective experience, in medicine, the focus is still detached from the subject. This is problematic when looking at the female body, as it becomes medicalised. The medical profession considers menstruation, pregnancy, childbirth and menopause as 'conditions' with 'symptoms' and thus requiring 'treatment' (Young, 2005, p.57). To Young, we have a subordinate relationship with our doctors. At the time she was writing, this hierarchical relationship is transferred into a gendered hierarchy within obstetrics/gynaecology where the large proportion of doctors were male. Obstetrics is a medical specialty concerning childbirth and midwifery. Men are thus in the position of power over the production of knowledge on the woman's body. In the phenomenological space, 'the pregnant woman has a unique knowledge of her body processes and the life of the foetus. She feels the movement of the foetus, the contractions of her uterus, with an immediacy and certainty that no one can share.' (Young, 2005, p.58) However, in the masculinised, public space of the hospital, the technological equipment for visualising and monitoring in an objective manner devalues the subjective nature of the bodily space and the woman's experience. Her body is once again a site of fluid boundaries, the knowledge of her phenomenological space is transferred out of her body to the doctor. Young writes that some humanistic authors believe the shared 'lived-body' experience is, 'a basic condition of good medical practice', therefore Young argues that in obstetrics, 'the basic condition of therapeutic practice cannot be met' (Young, 2005, p.58). Whilst I do not fully agree that this is a basic condition for all medical practice, in the case of the female body, gender asymmetry can lead to the production of a distance between doctor-patient and makes it hard to empathise.

The gender hierarchies that exist in the hospital public space therefore creates physical constraints on the pregnant woman's ability to move in that space and alienates her from experience. For example, most American hospitals do not allow women to walk around the space when in labour. Instead, women usually give birth in a horizontal position (Young, 2005, p.58). Davis-Floyd, looking at mothers in 'low-technology cultures', says, 'it is far more physiologically efficacious' to stand in labour 'than flat-on-your-back-with-your-feet-in-stirrups' (Davis-Floyd, 1994, p.323) The reason for the horizontal position and the use of instruments is that control over the means of observing the pregnancy moves from the woman to the medical personnel; the site of knowledge production is moved from the subjective experience of the woman to the objective means of male visual observation, which in turn devalues the woman's own experience of the process (Young, 2005).

However even at the time of the republishing of Pregnant Embodiment in 2005, these ideas were already under scrutiny. Susan E. Gerber and Anthony T. Lo Sasso showed in 2005 that the amount of men entering Ob/Gyn residency programs has declined (Gerber & Lo Sasso, 2006). This is a trend that has

continued. It exemplifies the temporal and spatial nature of gender discourses and suggests that as more women enter the medical profession that the site of the female body will be seen as 'normal body functions that occasionally have a disorder' (Young, 2005, p. 56).

Although I find her account pessimistic, as there are positives to the medicalisation of pregnancy, I do agree, however, that it can lead to the alienation of the female from her phenomenological space. I think the positive birthing movement, notwithstanding the critiques made earlier, helps in presenting pregnancy as a normal bodily function rather than a disorder and returns power back to the site of the female body.

This essay has highlighted the fluidity of geographic boundaries within gender, both for the bodily space and for the public and private spaces. There have been significant geographic and temporal changes to the notion of genders exhibiting specific spaces. However, the dominant discourses on gender in the West enables pregnant women's phenomenological space to be placed into the masculinised spheres of public control.

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Seeing the invisible: An investigation into 'difference' through exploring art inspired by Guantanamo Bay Detention Centre

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***Abstract* – This article aims to critically review narratives of difference through considering the artwork of Guantanamo Bay detainees. Through evaluating the (de)construction of binaries and boundaries between 'us' and 'them', this article discusses the creation of difference through artwork and the critical reaction to it. This works to both reinforce the Manichean binary between 'the West' and 'the rest', and emphasises the continual dehumanisation and alienation of the 'other'. Furthermore, the implications of this on the western imaginary of those detained without trial in Guantanamo are considered.**

"The dehumanising process has perhaps been the worst part of their treatment in U.S. custody"
Alka Pradhan, Human Rights Council at Guantanamo Bay, 2017

Introduction

September the 11th, 2001 was a watershed moment for strengthening and reinforcing the 'us and them paradigm', spurring increases in security, surveillance, and fear across the globe. 9/11 represented a dramatic collision between the Western civilised world, and a previously distant Arab other. In the following months, Bush's declaration of the 'War on Terror' marked the beginning of "civilisation's fight"[1] against this uncivilised 'other', to break-up Al-Qaeda and erase the Taliban government. To hold militants caught in this war, Guantanamo Bay Detention Centre opened in 2002. Suspected enemy combatants could be held there indefinitely, without trial or legal representation.

Guantanamo Bay is a US military prison located on the Cuban coast: a geographic space both within and outside of the United States, at the boundary between domestic and foreign territory[2]. It is this which makes Guantanamo an interesting and dynamic space to investigate geographies of difference; the 'other' held at odds with the United States. The physical distance between the U.S. and Guantanamo means prisoners exist there both politically and geographically separate from the US.

Why consider art?

This essay aims to investigate how geographies of difference are navigated, overcome, and often reinforced through artwork inspired by life in Guantanamo. Art directly challenges the dominant narratives surrounding the infinite detention facing prisoners, making a highly invisible group of inmates visible, by giving an element of humanity back to prisoners deemed "the most dangerous terrorists in the world"[3]. It reverses primary accounts of prisoners as threatening, merciless killers, although almost all are held without charge[4].

This essay will explore three main axes of difference: visibility and invisibility; power and incapacity; and finally, secrecy and intelligence, considering the binary of the seen and unseen through art. As Gregory cites: "visuality has become a strategic site of struggle"[5], creating a geopolitical area where concepts of 'us' and 'them' can diverge, and help the viewer make sense of the world and their place in it. This essay will explore this through the analysis of

Figure 1: Feeding Chair Camp 5, Cornwall, 2015.

1 George W Bush (2001) Transcript of President Bush's Address- September 21st, 2001 CNN.com/US [Online] Available at: https://edition.cnn.com/2001/US/09/20/gen.bush.transcript/ [Accessed 16 Dec. 2019].
2 Amy Kaplan (2005) Where Is Guantanamo? American Quarterly, 57(3), pp.831-858.
3 Nytimes.com. (2006). President Bush's Speech on Terrorism. [Online] Available at: https://www.nytimes.com/2006/09/06/washington/06bush_transcript.html [Accessed 16 Dec. 2019].
4 Eric N Olund (2007). Cosmopolitanism's Collateral Damage. In: D. Gregory and A. Pred, ed., Violent geographies: Fear, terror and political violence, 1st ed. New York: Routledge, p.70.
5 Derek Gregory. (2010). War and peace. Transactions of the Institute of British Geographers, 35(2), p.173.

a set of images from Debi Cornwall's "Welcome to Camp America" exhibition, and "An Ode to the Sea": a collection of artworks by Guantanamo detainees.

Debi Cornwall: Welcome to Camp America

Debi Cornwall's 2017 exhibition *'Welcome to Camp America'*[6] investigates the concepts of 'inside' and 'outside', challenging the narrative of Guantanamo as a foreign space, held in direct opposition to the U.S. mainland. She aims to manipulate viewers' (geo) political attitudes, through distorting what Dodds terms as their "moral geographies"[7]. Rather than reinforcing traditional images of the self and other, Cornwall's clinical, inhuman images evoke a feeling of numbness. Figure 1[8] frames a feeding chair, the restraints marking differences between the guards and detainee, whereby a wider story surrounding Guantanamo can be considered. The disorderly, barbaric Eastern world can be rendered powerless through restraint, and justified violence by guards. The obvious padlocks, chained rooms, and heavy sliding doors Cornwall photographs represent a dominant West, regaining control after a collision with the 'other', who bring chaos, fighting and lawlessness. However, the impersonal, clinical imagery challenges the morality of these actions, opening up space to investigate different methods of inmate detention.

When considering geographies of difference, we must acknowledge who is holding the camera, and therefore scripting the images we see. When the 'other' is heard, it must happen in terms constructed by the west. Said argues that we are "not quite ignorant, not quite informed"[9] of the actions of the 'other', and although we take Cornwall's photos as fact, the binary between secrecy and intelligence is overwhelmingly apparent.

Figure 2: Smoke Break, Cornwall, 2015.

Paradoxically, although Cornwall's photos are directly from the inside of the prison, they were subject to rigorous review before her camera could leave Guantanamo, and thus, the very thing she is trying to expose has power over what can be represented. Thus, Cornwall's work sits at the binary between visible and invisible, a concept she explores in "Smoke Break" (figure 2[10]) capturing an intimate moment between soldiers. However, their anonymity is protected, thus maintaining their power over the narrative, and distancing us from the reality of their work. As the guards stand with their backs to the viewers, their faces are hidden, and they cannot age. This gives a timelessness to the image, an ode to the infinite detention of Guantanamo's prisoners. The calm sea and tranquil sky disrupt what Hannah would term "the ticking-timebomb scenario"[11] which constructs the risk of terrorist attack as an impending disaster which could come from anywhere, at any time. The imminent attack which Guantanamo is working to avoid is paused; a narrative which disputes the U.S. Government's notion that these detainees are "unstoppable vessels of uncivilised violence"[12]. The contrast be-

Figure 3: Detainee Hospital, Cornwall, 2015.

6 Debi Cornwall (2017). Welcome to Camp America. [Photography] New York: Steven Kasher Gallery.
7 Klaus Dodds. (2007). Geopolitics: A Very Short Introduction. 1st ed. Oxford: Oxford University Press, p.18.
8 Debi Cornwall (2017). Welcome to Camp America, Feeding Chair Camp 5. [Photography] New York: Steven Kasher Gallery
9 Edward Said, (2003). Orientalism. London: Penguin pp. 55.
10 Debi Cornwall (2017). Welcome to Camp America, Smoke Break. [Photography] New York: Steven Kasher Gallery.
11 Matthew Hannah (2006). Torture and the Ticking Bomb: The War on Terrorism as a Geographical Imagination of Power/Knowledge. Annals of the Association of American Geographers, 96(3), pp.622-640.
12 Donald J Trump (2018) State of the Union Address- January 30th, 2018 theGuardian.com [Online] Available at: https://

tween the imminent danger the detainees pose, and stillness of the image leads the viewer to question the narratives of panic and fear surrounding inmates, directly challenging the ticking-timebomb scenario[13].

This binary between being highly classified, and the openly public represents a further axis of difference. The invisibility of detainees is manufactured to convey a sense of furtiveness around their activity, and their concealment amplifies their separation from society. This works in a geographic sense, with Cuba located on the periphery, somewhere "out there", but also holds them as a distinct population, capable of malevolence and evil, unimaginable by the civilised western world. Their actions are so incompatible with typical American values, they must remain hidden.

The ominous difference between the inside and outside means that what Cornwall leaves unseen is almost as startling as what we can see. "Detainee Hospital" (figure 3[14]) uses the binary of 'inside' and 'outside', held as two distinct categories, with the 'seen' and 'unseen' allowing the U.S. Government to script the narrative about the detainees' lives behind closed doors. It could be argued that although Cornwall hopes to expose the realities of Guantanamo Bay, she is instead creating an incomplete truth, which may reinforce a narrative of difference. The mysteries of the Orient are fanaticised about in the

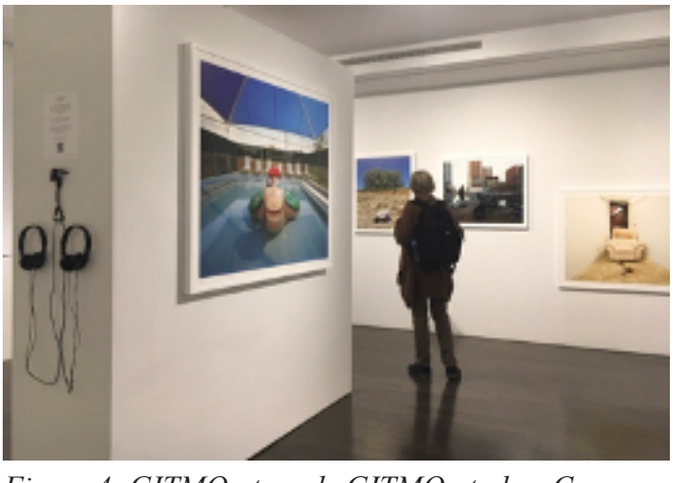

Figure 4: GITMO at work, GITMO at play, Cornwall, 2017 .

Western imaginary, much like the viewers' invention of what could happen behind the curtain.

The traditional binary of 'near' and 'far' is once more disrupted on Cornwall's gallery presentation of the images (figure 4[15]). The gallery space itself is used to create and resist narratives of difference. To the left of the image, a photograph of a child's swimming pool containing a giant cartoon turtle sits opposite from a chair used to torture prisoners, with the shackles below it chained to the floor to restrict prisoner movement. The proximity of these binaries, between innocence and evil, inside and outside is unsettling, and agitates the viewer, where 'their' world as prisoners exists so close to a children's playground. This disarrangement of two traditionally separate worlds is disconcerting.

An Ode to the Sea

Detainees in Guantanamo Bay live just metres from the sea, yet it remains elusive to them, a concept explored in *"Ode to the Sea"*[16]. Exhibited in John Jay College of Criminal Justice, it holds work created by eight men: four past detainees, and four men who remain in Guantanamo. The exhibit hopes to portray a less divisive narrative of difference: an alternative view of the 'other'. The controversial display sparked huge debate, with not only the exhibition's viewers, but whereby it represents a crossing of the 'other' into 'our' world. Paglen expresses how: "to be held in Guantanamo is to be dehumanised"[17], yet creating artwork represents a reversal of the prisoner's dehu-

Figure 5: U.S. Department of Defence/Reuters, 2002. Detainees after arrival at camp X-Ray

www.theguardian.com/us-news/2018/jan/30/the-full-text-of-trumps-state-of-the-union-address [Accessed 16th Dec. 2019]

13 Amy Kaplan (2005) Where Is Guantanamo? American Quarterly, 57(3), pp.831-858.

14 Debi Cornwall (2017). Welcome to Camp America, Detainee Hospital. [Photography] New York: Steven Kasher Gallery.

15 Debi Cornwall (2017). Welcome to Camp America: GITMO at work, GITMO at play. [Photography] New York: Steven Kasher Gallery.

16 Ode to the Sea (2017) John Jay College of Criminal Justice, New York.

17 Trevor Paglen (2017). Ode to the Sea: Art from Guantanamo. Postscript Magazine 1st ed. New York: John Jay College of Criminal Justice. Pp. 9.

manisation, and an answer back to the West from a voice which is normally muted.

The traditional narrative of 'us' representing 'them' is undermined, whereby the detainee's art erases the monolithic representations of Islam[18] the west has become accustomed to and empowers individual voices. The power of an Orientalist narrative comes from its asymmetry, with the West controlling the terms of representation, and the East held silent,

Figure 6: Crying Eye, Mohammed Ansi 2016.

yet "Ode to the Sea" reverses this. Unlike Cornwall's work, the detainees themselves have a voice, bringing those on the outside of American society into the centre, and the unseen becomes disarmingly visible.

The veil of invisibility placed over Guantanamo, and the classified nature of the activities gives the US government power to script public knowledge about the base, thus the binary between secrecy and intelligence becomes apparent. One striking example of this was the release of the first picture of the detainees (figure 5[19]). Butler considers how "the individuals were rendered faceless and abject, likened to caged and restrained animals[20]", with the photos made deliberately public by the U.S. Government, "to make known that a vanquishing had taken place[21]". The Manichean narrative of 'good' and 'evil' demonstrates how the US puts forward an easy-to-understand narrative, which places it as a universal power for good.

Guantanamo holds detainees as the ultimate 'other', directly opposing American values. Mohammed Ansi's Crying Eye (figure 6[22]) shocks the viewer, as the obvious emotion is depicting works against the narrative that those in Guantanamo are part of an "axis of evil"[23], representing "unprecedented dangers"[24] to the U.S. In stark comparison to Cornwall's exhibition, 'Ode to the Sea' elicits difference in a contrasting way. While Cornwall's photographs are disarmingly clinical, using a narrative of entrapment, and being held at a distance from the western world, Ansi's art is hugely emotive and human, allowing us to question his entrapment. The critical reception to each exhibition was starkly different, demonstrating how geographies of difference remain.

The reception to Cornwall's exhibition was overwhelmingly positive, with the Guardian's Zack Hatfield praising her "artistic integrity", stating we "should be grateful" for her "imaginative", "playful" and "investigative" work[25]. In contrast, reactions to "Ode to the Sea" ranged from revulsion to shock, with Lee Ielpi, the father of a victim of the attacks citing the work as "disgusting" saying it "should be trashed"[26]. Allowing the 'other' to speak creatively and freely challenges the binary between the East and West: unacceptable to the Western imagination. The detainees exist solely as a vehicle for American revenge, and to consider otherwise is to question their

18 Edward Said, (2003). Orientalism. London: Penguin.
19 U.S. Department of Defence, Detainees at Camp X-Ray inside Naval Base at Guantanamo Bay Petty Officer 1st class Shane T. McCoy/U.S. Department of Defence/Reuters.
20 Judith Butler (2004). Precarious life: the powers of mourning and violence London: Verso. Pp. 53.
21 Ibid., 54.
22 Mohammed Ansi. (2016). Crying Eye. [Pigment on Paper] New York: Jay John College of Criminal Justice.
23 George W Bush (2001) Transcript of President Bush's Address- September 21st, 2001 CNN.com/US [Online] Available at: https://edition.cnn.com/2001/US/09/20/gen.bush.transcript/ [Accessed 16 Dec. 2019].
24 *Ibid*.
25 Hatfield, Z. (2019). Debi Cornwall's Welcome to Camp America by Zack Hatfield. [online] the Guardian. Available at: https://www.theguardian.com/culture/2018/feb/25/observer-anthony-burgess-prize-runner-up-zack-hatfield-welcome-to-camp-america [Accessed 16 Dec. 2019].
26 Amy Reiss (2019). Exhibit of art by Guantanamo detainees draws controversy. [online] NBC News. Available at: https://www.nbcnews.com/news/us-news/exhibit-art-guantanamo-detainees-draws-controversy-n824726 [Accessed 16 Dec. 2019].

infinite detainment.

Backlash to the exhibition led to the Department of Defence reviewing its handling of the art, citing that "Items produced by the detainees at Guantanamo remain the property of the U.S. Government"[27]. Once more: the voice of the 'other' is scripted for the benefit of the West. The "right-to-power"[28] over this art replicates the Orientalist notion that material objects gain importance through their usefulness to the West, and thus, the right to self-representation is undermined. The commodification of detainee's art resonates with Gregory's description of infinite detention as "asymmetric warfare"[29], whereby all the benefits of this creativity are bestowed upon the West.

Traditionally, the West sees 'them' as devoid of culture: savage and barbaric, located in a space so foreign it would be unrecognisable to the American observer. The intricacies of Al-Alwi's elaborate model ship (figure 7[30]) begins to reverse the idea that

Figure 7: Model of a Ship, Moath Al-Alwi, 2015.

'they' don't have culture. Viewers were astounded at his achievements[31], validating Al-Alwi's life, and allowing his participation in cultural discussions, alerting the viewer to a wasted life: a talent trapped in Guantanamo.

Conclusion

Overall, the art shown here is used to articulate binaries of 'the west and the rest' in a new way. Both "Welcome to Camp America" and "Ode to the sea" represent difference in hugely diverging ways, and break into the traditionally closed system of representation which surrounds Guantanamo. Dehumanisation works as a tactic employed by the West whereby it can continually distinguish itself as superior[32], yet this collection of artworks acts to give humanity back to detainees whose lives are used to enact a continual binary of 'us' and 'them' through their infinite detainment; politicised beings framed by their groundless and infinite violence.

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The city is what it is not: how representations of contrast (re) shape the vision of China's city

Ally Mair (Fourth Year, Geography)

Abstract – **In this paper I argue that China's contemporary urban space is represented and (re) produced through the contrast of a normative rural-urban binary. This paper looks at China's urban space in three parts of defining city framework: firstly, and most broadly, it is urban through contrast; secondly I look at how city spaces are produced and defined in contrast to the patchwork of urban villages in the cityscape; and thirdly I look at how urban space is upheld as a site of progress and development which contrasts perceived 'backwards' practices of rurality in China. I conclude this paper with an understanding that China's urban space is not only represented by rigid contrasts with rurality, but is also (re)shaped, (re) imagined, and (re)produced by this distinct rural-urban binary.**

Introduction

China's urban space is represented through different understandings of what it means to be urban. Chiefly, urban space is represented through contrast, especially with ideas of rurality and the village, and through a nexus of industry and growth in which progress is measured by means of contrast. This essay intends to highlight how different authors discuss China's urban space through the aforementioned notions of representation and will explore new ways of thinking about this depiction.

Urban through contrast

Bach (2010) discusses the prominent use of contrast to represent China's urban space as politico-legislative representation, defining the urban through what is not urban in the process of generating a rigid rural-urban binary. Farquhar and Zhang (2014) focus on the contrasting ways in which people use urban space, and Zhang (2014) sees urban space contrasting between empowerment and restriction for female migrants. Despite different contrasts defining Chinese urbanity, they all agree that notions of the city are complex and conflicted, as they are represented through contrasts defining the city in relative terms, usually against the rural (Bach, 2010, p.422).

Bach (2010, pp.422-425) notes that legalities have 'removed' the village from the city, and although this lends to a politico-legislative view of urban uniformity, it neglects that many uphold their rural identity. However, Zhang (2014, pp.19-21) notes that some women actively reject their rurality to mitigate restrictions, embracing what is seen as an empowering and feminine urban identity. Despite contrasting identities, the city, in a politico-legislative sense, is represented as urban in its totality, whereas, in an individualistic sense, identities of China's urban space represent less rigid notions of what is urban, incorporating rural/non-urban identities into the fabric of urban space.

Furthermore, Bach (2010, p.425) also takes note of what an official model sees as a 'missing feature' in Shenzhen - that it has no villages. This 'missing feature', according to the model, is what makes the urban space harmonious, prosperous, and a site of 'sustainable' economic development. Although this model is simplistic because it omits many problematic factors that the urban space experiences, it is a clear example of China's urban space once more being defined not by what it is, but rather by what it is not. Urban space is represented as rigid and lacking fluidity; that is to say if something is not urban it is rural and vice-versa. This is a politico-legislative production of a normative binary which is productive for those who the urban space benefits, yet fundamentally restrictive for those who hold a non-urban identity (Zhang, 2014, pp.24-25). This is furthered with the non-urban/rural omission as an embodiment of the, 'narrative of progress, civilization, and urbanization', drawing on stereotyped notions of rurality as, 'dirty, chaotic, and backward', a 'cancer' to the city's goals of economic success and growth (Bach, 2010, p.425). Overall, Bach (2010, p.427) is arguing that urban space is represented as a site of progress which contrasts with the normative narratives of rurality.

Moreover, considering urban accessibility, Bach (2010, p.427) uses Solinger's (1999, pp.36-45) idea of representing the urban as a site of restriction and inaccessibility for rural peoples. In this sense, maintaining a basic standard of living and finding belonging is met with struggle (Zhang, 2014, p.21). This strife of the peasantry in the face of exclusionary urban representation is responsible for generating a reserve labour force which is submissive and disposable (Zhang, 2014, p.17). This furthers Castells' (1977, pp.7-64) notion of cities being large convergences of exploitable labour and capital. Castells (1977, pp.75-86) reminds us that this must not be romanticised simply as economic progress, and, in doing so, neglect the lived actualities, especially of those who remain

'rural' in the urban. Overall, processes of urbanisation are fundamentally geared towards capitalist exploitation, where a distinct rural-urban binary is used to justify the restrictions to those seen simultaneously as tools towards economic growth and disposable peasants who are not aligned with the idea of China's urban space.

Urban through villages

China's urban space is also represented through contrast when discussing urban villages. The village spaces, and their relative socio-spatial successes, despite the village communities' methodologies for reproducing the rural within an urban framework being critiqued by urban officials as 'backwards' and 'feudal' in nature (Bach, 2010, p.434), are prime spaces for study with regard to China's urban representations. However, this representative critique is a structuralist idea of what it means to be 'urban' and 'civilised' which neglects to comprehend the significance of consumption and distribution in capital sites of resistance and political creativity (Harvey, 2009, pp.108-116). Farquhar and Zhang (2012, pp.50-52) further this idea of urban potentiality by discussing different ways of using the city, acknowledging the poly-centricity of urban space and its associated desires and growth. Additionally, politico-legislative representation of the city as that which is not rural fails to appreciate the daily and public, 'yangsheng practices' (Farquhar & Zhang, 2012, p.52) and the adaptive mentality and economic successes that have come with villagers' methodologies. This representation of China's 'urban rurality' being muted in its perceived progress because it is not representative of politico-legislative notions of Chinese urbanity raises Lefebvre's (1973, pp.29-35) idea of cities embodying the debate of human potentiality, stifled by the logic of capitalism. If this is to be taken seriously then China's urban officials ought to uphold the right to the city. In this space, urbanism should be placed in a nexus of Marxist-Humanist dialectics situating use-value over exchange-value (Harvey, 2009, pp.153-194) in order to allow the urban spaces' potentialities to come to fruition, instead of repressing different ways of being in the city to thus represent the city as that which it is not.

However, it is believed that recently the Shenzhen government has reached a 'tipping point' on their tolerance of villages, and although there are genuine concerns of security and safety, '"civilization" is the core issue' (Bach, 2010, p.434). City officials desire 'their' urban space to be represented, as 'civilised', in what one could postulate is reactionary politics to a legacy of colonial trade as a means of legitimising China's urbanity as valid city space capable of internationality and progress. Bach (2010, p.440) continues to discuss the notion of rendering a space civilised, as integration of villages is sought within the urban space, showing a dichotomy of planning over lived reality (Farquhar & Zhang, 2012, p.52); representing urban space through contrast.

Urban through development

Bach (2010), Farquhar and Zhang (2012), and Zhang (2014) represent China's urban space, in part, as sites of industrialisation, growth and consumption. The imagery used here is productive, in the sense that it promotes ideas and validates the practices of economic progression, expansion, and differentiating the city from the village. However, these notions of the city represent urban space as one whole and neglect the individual. However, Barthes' (1967 in Bach, 2010, p.422) notion of the city compares it to a poem which is not formulated for the subject but rather shapes itself to show the city functions with interconnected and individual parts, thus providing an inclusive understanding.

Storper and Walker's (1989) study of city-sites shows that urbanisation is determined chiefly by the growth and spread of capitalist industry, with other aspects of urban form corresponding with these ideas of capitalist industrialisation. This is furthered by Coe (2008, pp.145-151), framing the neoclassical imaginings of urbanity as restrictive, assuming that exchange is the cornerstone of economic activity, with the aim of this to provide effectual and accessible resource allocation and a state of equilibrium. This understanding proves useful in the visualisation of China's urban space, as it is often represented as functional and 'purely' urban (Bach, 2010, p.423), rather than functioning in a relative way where each city has unique ways of being which are not necessarily based on exchange but other factors such as growth, identity and available labour (Zhang, 2014, pp.17-18). Moreover, China's urban spaces must not be thought of as sites of exchange and access equilibrium, as this fails to address inequalities which are sometimes omitted from particularly optimistic research of urban villages or urban growth (Farquhar & Zhang, 2012; Oakes, 2016). Coe (2008, pp.145-151) highlights an inverted understanding of the neoclassical, that there is an acknowledged state of disequilibrium in the economic system, which is mobilised by a motivation to grow and change by its own internal laws of surplus generation, investment, and competition. Coe's (2008, pp.145-151) understanding of Stor-

per and Walker's (1989) notions of urbanisation is a solid example of that which is often excluded in the politico-legislative sense when representing China's urban space as it includes what officials often omit.

Conclusion

Fundamentally, China's urban space is not only represented but arguably (re)shaped through contrasts which are productive for those that these politico-legislative contrasts grant privilege to, but deeply restrictive to those which represent different ways of using urban space. Restriction is represented by notions of a 'civilised' city, placing exchange-value over use-value, growing as one in every sense whilst neglecting the individuals which make up the urban space and their relative needs. Overall, China's urban space is often represented through what it is not, in a rigid and restrictive attempt to differentiate the urban from the rural.

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"We're the new blacks": Life after 9/11 for Arab-Americans

Mark Edwards (Fourth Year, Geography and Modern History)

Abstract – **Difference is a key concept in Geography, and the 'geographies of difference' are a widely studied aspect of the discipline. In studying these geographies, we seek to analyse why these differences exist, where they have arisen from and why they are important. In the case of the global events following 9/11, difference became a facet of life in America, and indeed the world. With President Bush announcing that "either you are with us, or you are with the terrorists" the world became a binary between 'us', those that were attacked, and 'them', the terrorists and those people, cultures and countries associated with them. It is in this context, and with Edward Said's 'Orientalism' providing a theoretical background, that this essay seeks to show that difference became a significant aspect of daily life for many Arab-Americans in the wake of 9/11, proliferating through a plethora of aspects of American society.**

The events of 9/11 sent shockwaves across America and the world: they pushed issues of national security to the front of domestic American affairs, they had a profound effect on the US economy (US real GDP growth in 2001 dropped by 0.5%) and mass border securitisation and rethinking of border processes took place across the world.[1] However, whilst these consequences were extreme, their place was at the global and national scale, not at the local and their recognition neglects how life changed on a quotidian level for many. Hardened by President Bush's declaration that, 'either you are with us, or you are with the terrorists', which brought the 'War on Terror' into the domestic American sphere, life was significantly altered for many Arab-Americans and American Muslims by the events of 9/11.[2] Noticeable 'us and them' mentalities developed across society, with issues of difference coming to the fore. In this context, this essay will use the accounts embedded in Moustafa Bayoumi's *How does it feel to be a problem? Being Young and Arab in America*, as well examples from post-9/11 visual and media cultures, to elucidate how difference came to be a pervasive aspect of daily life for many Arab-Americans in a post-9/11 world. The analytical foundations of this will lie in Edward Said's ground-breaking novel, Orientalism, with Said's frameworks of understanding geographies of difference serving to underpin the arguments.[3]

The problematisation of Arab-Americans: the quotidian

Bayoumi's How does it feel to be a problem? takes the stories of seven young Arab-Americans, in order to show how life was meaningfully altered in the wake of 9/11.[4] The stories told in the book were all elicited from interviews and ethnographic research, and the information therein provides an insightful lens through which to understand the individual impacts of 9/11 on the lives of Arab-Americans, especially with regards to the construction of difference.[5] The first

1 Globerman, S., and Storer, P., (2006). The impacts of 9/11 on Canada-U.S. Trade. Border Policy Research Institute Publications, 88, p.2; Mabee, B., (2007). Re-imagining the Borders of US Security after 9/11: Securitisation, Risk, and the Creation of the Department of Homeland Security. Globalizations, 4(3), p.390.

2 Bush, President G.W., (27 October 2019) Address to a Joint Session of Congress and the American People; Amoore, L., (2007) Vigilant Visualities: The Watchful Politics of the War on Terror. Security Dialogue, 38(2), p.217.

3 Said, E. (2003), Orientalism, London: Penguin Classics. pp.2-7.

4 Bayoumi, M., (2008). How does it feel to be a problem? Being Young and Arab in America. New York: Penguin Books. pp.9-12

5 Ibid., p.11.

> They [the traders at the commodities exchange where Sade worked] would **crumple paper into balls (as if they were stones)** and throw them at him [Sade]. "**Go back to Palestine!**", they'd yell, and laugh. When he wouldn't laugh back they'd retort with, "Hey, we do it because we love you." But Sade didn't buy it. On the other occasions they would scream, "**Don't blow yourself up!**" to him… Then one day shortly afterward, the bosses asked Sade's brother [who also worked at the commodities exchange] to bring in his passport…**He's an American citizen, but they paid close attention to his Jerusalem birthplace**. Days later the director called Sade into her office…**to tell him that he had to go.**

Figure 1. Excerpt from Bayoumi, M., (2008). How does it feel to be a problem? Being young and Arab in America, pp.191-192.

quote of interest is from an unnamed individual, who said that in a post-9/11 world, "we're [Arab-Americans] the new blacks".[6] In this short quote, the speaker invokes the history of African Americans and their obvious history as the Other in America. Here, the speaker's language and matter-of-fact approach is uncompromising, arousing images and knowledge of decades of slavery, civil rights abuses and struggles with which African Americans had to contend with. Therefore, with reference to constructions of difference, the speaker is implying that Arab-Americans, in a post-9/11 society, have become the new Other, under suspicion and systematically prejudiced against by the wider American community in the same way that black Americans had experienced.

Furthermore, the testimony from Sade, at the time of being interviewed a 25-year-old Arab-American, born in Jerusalem but an American citizen, illustrates how harassment became an inescapable facet of life, whilst elucidating how difference was constructed in the wake of 9/11, with the 'War on Terror' and political sentiments justifying such Othering. *Figure 1* provides an excerpt from his account. A number of aspects of Sade's account are particularly striking in their explicitness. The action of throwing crumpled paper, "as if they were stones" evidently draws on pejorative stereotypes and imaginaries of the modern Orient as a society. It is fixed upon the continued usage of stoning as an execution method in some Arab countries, and its utilisation as a form of harassment is implicitly linked to the idea of the Orient as a place of savagery and barbarism (as recognised by Said as a key trope of Orientalism).[7]

Moreover, the comment that Sade should, "Go back to Palestine", when he is an American citizen, is a further example of the Othering of Arab-Americans. It suggests that despite being an American citizen, Sade's allegiance was viewed as intrinsically linked with another region of the world, and not with America, making Sade an Other in his own country. In this vein, it is inextricably linked with Bush's comment that, "either you are with us, or you are with the terrorists" by implying that Sade is not with 'us' (the American people) but rather with Palestine and, by extension, with terrorism. Furthermore, the comment, "Don't blow yourself up!", explicitly likens Sade to a terrorist, again pitting him against 'us', the good American citizens. This instance, therefore, shows the way in which Bush's comments linked directly with processes of Othering in the daily sphere post-9/11. Finally, Sade losing his job for seemingly no apparent reason other than his heritage is a further example of the construction of difference; work-places became hostile to Arab-Americans and Muslims, based upon basic differences in heritage and background. However, in the context of this author's positionality it is impossible to know the full details for sure.

Sade's story is mirrored by that of Omar, a 22-year-old (in 2006) who also suffered work-related discrimination post-9/11. Omar was black-listed from nearly all of the major television news networks in America because he spent some time doing work experience with Al-Jazeera.[8] During a background check for a data manager post with the City of New York, his manager said to him,

> '"This", she said, pointing to the line on his resume that Omar was most proud of, his work at Al-Jazeera, "this could work against you in the future. Especially if you want to get work with people who feel threatened by the whole Arab thing."' [9]

The notion that an individual could become blacklisted from a vast number of television corporations for work experience with an Arab news network is thus an example of the power of exclusionary mentalities in the post-9/11 American society. Whilst Omar's manager's comment about, "…the whole Arab thing" demonstrates the sweeping reductionism at work in American society post-9/11 towards Arab-Americans. The idea that *all* Arab-Americans could be reduced to a 'thing' is a fundamental motif of 'us and them' which essentialises all Arab-Americans to terrorists, anti-Americans and threats to the state. Like Sade, Omar's own position as an American citizen, further highlights the basic assumptions made in American society – assumptions were made that *anybody* with Arab heritage, despite their citizenship, *must* be a menace.

Omar and Sade's stories were, however, not unique. From 2001 to 2013, the American Equal Employment Opportunity Commission (EEOC) received 7,019 discrimination claims by Muslims, compared with a cumulative of 2,734 charges in the years before 9/11.[10] Within the total number of claims, Muslims comprised 25 percent, despite only making up 1-2 percent of the total American population.[11] This is also likely only the tip of the iceberg, with many instances of discrimination and harassment at work going unreported. Thus, these two examples elucidate

6 *Ibid*., p.2.
7 Said, Orientalism, p.86.
8 Bayoumi, How does it feel to be a problem? Being young and Arab in America, p.216.
9 *Ibid*., p.208.
10 Abdelkader, E., (2014). Savagery in the Subways: The First Amendment, Anti-Muslim Ads and the Efficacy of Counter-speech. Asian American Law Journal, 43, p.50.
11 Ibid.

For all women, the reality is stay in the house unless you have a pressing need to go outside. If you have a pressing need to go out, you must wear the veil. **If you marry, your husband can say three times "I divorce you," and you're divorced**. The other way around is not possible. The problem of **child brides in Saudi Arabia is as common as drinking espresso coffee in Italy**. It is because the Prophet Mohammed married a 9-year-old girl. **Every man in Saudi Arabia feels that he can marry a minor or he can marry off his daughter who is underaged**. You will be **stoned, flogged if you commit or even make the impression that you may have committed adultery.**

Figure 2. Excerpt from Hirsi Ali, A., (2007). Women and Islam; U.S. Military Turning the Corner in Iraq?

the constructions of difference in a daily setting, illustrating the production of Othering discourses and actions across American society in the wake of 9/11. In this present essay it is impossible to explore all of the manifestations of difference presented in *How does it feel to be a problem?*, but Bayoumi elucidates how 'us and them' mentalities also pervaded the schooling and justice systems too.[12]

Difference in mainstream public discourse

Where earlier examples illuminate the way in which specific individuals experienced Othering in their day-to-day life, it is noteworthy that these processes of exclusion percolated into the mainstream. The 'us and them' mentality extended into wider public discourse, contributing to the exclusion and essentialisation of Arab-American communities.[13] Thus, it did not simply remain a facet of Arab-Americans' personal lives. One way in which this occurred was through the brutalisation of Islamic culture and society, with mainstream debates presenting a monolithic image of Islamic society, portraying it as a profoundly

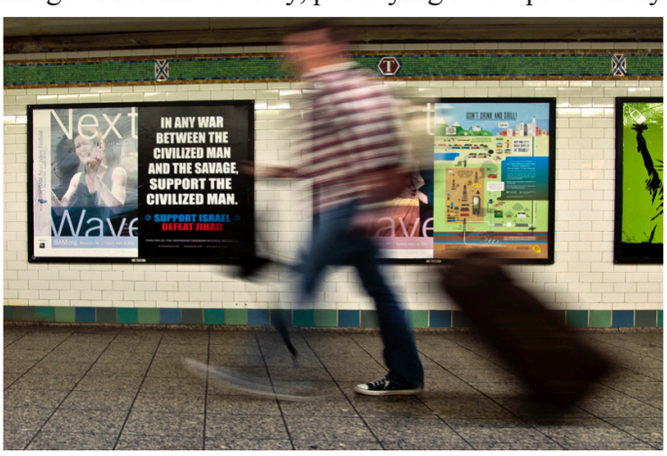

Figure 3, Anti-Islamic American Freedom Defense Initiative poster, "Support Israel, Defeat Jihad" advertisement (2012), on the New York Subway.

'lesser' culture in comparison to the West.[14]

Figure 2 provides an excerpt from an interview with Ayann Hirsi Ali, a Somali-Dutch activist, broadcast on Anderson Cooper's CNN show. The interview presents a fundamentally Orientalist representation of the Arab world by reducing it to the simple trope of a tyrannical society, in which personal freedoms are repressed and activities commonly take place that would be considered abhorrent in Western society. Hirsi Ali's claim that "all women" must stay inside and that child brides are, "as common as drinking espresso coffee in Italy" is a hyperbole, which reduces all of Arab society to such characteristics.[15] Thus, it lacks nuance and rejects any geographies of difference that are present in Arab society, whilst creating binaries between the Orient and the West. Furthermore, her drawing upon the divorce laws is again reductionist.

Overall, Hirsi Ali draws upon the fundamental binaries on which Said constructed the notion of 'Orientalism', those of positive versus negative, democratic versus despotic, and progressive versus static and backward.[16] In Hirsi Ali's description, the Orient is represented as the region where child brides are the norm, stoning and flogging continue to take place and women lack basic freedoms, which is implicitly contrasted with America and the West.[17] Thus, this description, which featured on a prominent American talk show, illustrates how Orientalist discourses were produced in mainstream media and were not 'hidden' within individuals' private lives. Instead, such narratives were made inherently public and explicit. Moustafa Bayoumi argues that this example, as well as others in the media, exemplified the 'neo-Orientalism' that emerged in the post-9/11 world, which consistently held Islamic and Arab society up as different, lesser and despotic.[18] For many Arab-Americans, this

12 Bayoumi, How does it feel to be a problem? Being young and Arab in America, pp.13-44; pp.81-114.

13 Alsultany, E., (2013). Arabs and Musims in the Media after 9/11: Representational Strategies for a 'Postrace' Era. American Quarterly, 65(1), p.162.

14 Ibid., pp.165-167.

15 Hirsi Ali, A., (2007). Women and Islam; U.S. Military Turning the Corner in Iraq?

16 Said, Orientalism, p.206.

17 Hirsi Ali, Women and Islam; U.S. Military Turning the Corner in Iraq?

18 Bayoumi, M., (2010). The God That Failed: The Neo-Orientalism of Today's Muslim Commentators, in Shyrock, A. (ed.),

neo-Orientalist discourse contributed to their changing status in American society and their feelings of exclusion.[19]

This Orientalist rhetoric was also supplemented by a growing visual culture which became integral to the domestic 'War on Terror' and the way in which Arab-Americans lived their lives post-9/11.[20] One advertisement, *Figure 3*, engaged with the Orientalist trope of the despotic and lesser Orient versus the civilised West, explicitly equating Muslims with savages.[21] Again, what the advertisement illustrates is the force of exclusionary discourse in American society following 9/11 – it created fundamental binaries based on Orientalist signifiers. The advertisement was not only placed in the subway, but also on the side of buses and in transport interchanges across San Francisco, New York, Washington DC and Chicago.[22] Thus, it was in plain view of millions of people every day, representing the growing visual culture that became an integral part of the domestication of the 'War on Terror', which in turn constructed difference across American society.[23]

However, these images also became sites of counter-messaging, illustrating efforts to counter the exclusionary visual culture. Stickers were placed on the posters reading "racist" and "hate speech", and one revision read, "In any war between the colonized and the colonizer support the oppressed. Support the Palestinian right of return".[24] Here, though, whilst trying to counter the original images' modes of exclusion, the narrative continues to revolve around creating difference, and an 'us and them' binary (colonised versus coloniser). Nevertheless, this process of message and counter-message continues to show the division within society, with binaries across societal discourses becoming a fundamental aspect of domestic 'War on Terror'.

Conclusions

Some of the constructions of difference described herein have been more latent and implicit than others; Omar's discrimination based on his previous work with Al-Jazeera was more implicit than Sade's harassment at work, or the likening of Muslims with savages. Yet, they all contributed to what Iqbal Akhtar has termed the 'political problematisation' of Arab-Americans and Muslims in a post-9/11 world.[25] In this problematisation, these groups have become second-class citizens and Others who are expected to be security threats, rather than good citizens of the USA who do not pose a security threat.[26] In short, Arab-Americans and Muslims have become a problem and an Other to the rest of American society. Interestingly, the examples illustrated within this essay come from the late 2000s and early 2010s. Yet, nearly ten years later, many of these constructions of difference remain significant. The "Go back to Palestine" comments that Sade experienced have been echoed by the "Go back home" chants that President Trump and his supporters levelled at a group of Congresswomen.[27] Whilst Islamic societies and communities continue to be largely represented as 'savages', 'radical' or associated with war in American media.[28] The significance of this is that it shows that difference and 'us and them' mentalities remain an aspect of life for many in America, where time has not eased the use of Orientalist binaries nor discourses. In this sense, Dick Cheney's comment that, '[The War on Terror] is different than the Gulf War was, in the sense that it may never end. At least, not in our lifetime', was certainly apt: domestically, the war continues.[29]

Islamophobia/Islamophilia: Beyond the Politics of Enemy and Friend. Bloomington, p.85.

19 Ibid., p.90.

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21 Anti-Islamic American Freedom Defense Initiative, (2012). Support Israel, Defeat Jihad.

22 Abdelkader, Savagery in the Subways, p.54.

23 Delmont, Introduction: Visual Culture and the War on Terror, pp.157-158.

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27 Pengelly, M., (2019). 'Go back home': Trump aims racist attack at Ocasio-Cortez and other congresswomen'. The Guardian.

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THE RUSTENBURG UNDERGROUND – AN ACCOUNT OF AN UNDERGROUND MINING INTERNSHIP IN NORTH WEST PROVINCE, SOUTH AFRICA

Charlotte Barrow

The usual 05:15 alarm. I wake up impressed, realizing that I managed to sleep last night. I roll out of the heavy rose blanket and sheet and stumble to the bathroom. After the usual relief, I scramble for clothes. Despite the brown towel at the foot of my bedroom door, South Africa's winter draught manages to slip its way through and wake me up double time. I can hear next doors' shower valve turn; everyone is slowly rising. The kettle starts to rumble, and my rooibos tea and Weet-Bix are motivating me to keep rolling through the day's motion.

I pull up at the training centre. It's pitch-black and will be for another hour. It's cold and my walking is constricted by my new overalls and industrial boots. Sign-in, blow (alcohol testing), clock-in and wait in training Room 4.

Justin walks in and I look at him like a dog waiting to go for his first walk of the day. I am told to wait and that he will first address his morning coffee.

Whilst I wait (I have become extremely good at waiting, maybe I can add that to my list of 'Soft Skills'), I take the opportunity to ask one of the women what she is doing here. She is 54 years old and looking for an early retirement. She has been working on the mine for 11 years now and says she loves her job. She is a miner and predominantly works the night shift (20h00 – 04h30). Being a miner, her every day entails going down the shaft and mining out the ore by means of barring, blasting and backlashing. Backlashing is where you take the ore away from the site of blast. All the ore is then taken to the Tip Attendant by an LHD (an underground vehicle) to be placed on the conveyor belt for surface delivery. She was promoted to team leader a few years ago and told me about her feelings of standing in front of a team dominated by men. She said she had great fear and that she stood behind a pillar before her first meeting. She went on to describe how her whole body shook, but as soon as she opened her mouth she smiled and spoke like she had no worries at all. She said if there is a frown you are always in for trouble. I'll remember that one. She told me not to fear going under, and if I have fear to think of her and that I must be strong for all women underground.

It was now time for me to go. Justin let me follow him through the training centre quad. The day was dawning and I was confused as we made our way to Room 10: the 'pass out' room. After a week sat in front of a screen filled with safety procedures, was I going to be let out of the training facility today?

I enter Room 10 and immediately eyes are on me. It is clear to see that I am in the minority here. I just smile, if in doubt smile. It's a personal motto and so far it has served me pretty well. Smiles seem to eliminate the scent of fear, as long as they beam and aren't awkward of course. Naturally I start talking because that's also another coping mechanism. "Hi, I'm Charlotte! What's your name? … What do you do here? … How long have you been here? … Ah you have kids, that's so nice!" etc. etc. It's the perfect remedy really. Be the chatty smiley girl as opposed to just your bog-standard white privilege who assumes the world owes you everything.

Michael enters. Michael takes the 'pass outs' for their final underground induction. He is full of charisma and I can see by his benign curiosity of me that I will be looked after. He assures me that I will be fine and will soon enough get used to the steep chair lifts that will lead us underground.

I, of course, try to hide any angst with yet another smile and laugh.

* * * * *

Everyone is clustered around the bus. The sky starts to turn a dirty yellow as it begins its day too. The door opens and people clamber to get on. I wait to be the last person on, praying that no one takes the seat next to the door. I can deal with verbal harassment just fine, but to be honest I just can't be bothered with trying to find a new way to shield the oncoming fire. My prayers were answered as the other supervisor Gert says he has saved a 'special seat' for me. The bus hums whilst we wait for Michael. The African beats begin to play and as Michael hurls onto the bus he begins to dance and shake sending the rest of the trainees into hysterical laughter. I cannot think of a better palate cleanser to ease my angst for the rest of the days' adventure.

We arrive at the backside of the mine and are unloaded. We walk through a winding caged path

and meet the changing facilities. Luckily, I changed at home and so skip through the lockers to the other side and into another cage. I am assigned my head torch and ResQpac. I can feel the other trainees' eyes on me as I struggle to attach these items to myself. A keen gentleman, also a trainee, decides he will take the responsibility to holster my ResQpac. I am both grateful and awkward about this enthusiastic man-handling. Nevertheless, I am set. Phone confiscated as contraband. My lifeline is gone and now I feel well and truly alone. Who am I kidding, I have been alone the whole time. A phone call was never going to save me anyways.

The bicycle lift. I have seen a picture of this unique commuter train. Just like a ski chairlift, I am sure you, dear reader, have seen one of these on your family getaways to the Alps or further afield. Essentially, it is a suspended seating device. However, instead of a regular seat, you are expected to mount a bicycle seat attached to the overhead cord. Oh, and if you fall off, I am afraid the powdered snow is replaced by a smack of concrete.

Everyone gets on with ease; they can do it in their sleep. I am very much awake and again praying that I don't make a fool of myself by plummeting to my death mid journey. Alas, I swing my leg over the seat and grip tightly onto the cold bar in front of me. The echoed laughter starts and I hear Michael shouting behind me: "Charlotte, are you okay?". I feel okay. My torch begins to shine from side to side as I am both terrified and amazed at the sights I am seeing. What a bizarre situation I have found myself in, yet again. And I'll tell you that this even beats the time I drove three hours into rural Zimbabwe with two strangers. Yes. This by far beats that.

What first strikes me is the sheer drop. It must be at least a 50-degree decline and it's cold, really cold. A channel of air pumps up from below. I am not sure whether it is part of the ventilation or if it is the cool North West morning trying to find its way out from under. The tunnel is curved and has been painted white all around. Who painted this? No. Who dug this? When did they dig this? The truth is that your imagination doesn't have to wonder far before you have probably landed on the correct answer all on your own. It smells damp and the noises are plenty. The electricity pumping through the lift and the clanking of each lift passing a belt. The water pumps through the pipes near your head. Then it is the people that shout and laugh and whistle and sing as they would at home. From time to time we pass an old shaft to our left or right and I try to shine my torch on what once was, but see nothing.

At the end of chairlift 1 we hop off and walk into the darkness. A new sort of walk evolves. A right-sided head tilt or in worse situations a crouch walk as the ceilings can be as short at 1.5m, which for my 1.8m does not suit. The head torches start to shout at us as they detect an oncoming vehicle and we wait for the wheeled pancake to hover on past.

Chairlift 2 and 3 are less steep but equally as fun, and after more zombie-walking beside conveyor belts of freshly clanked and boomed ore we meet The Waiting Room.

After a brief talk about highly important safety procedures and several raised eyebrows and winks to my right-hand side by Jimmy, we set off to the Refuge Bay. The Refuge Bay is like a World War II bunker, but skew. It is hard to hear because of the compressed air bashing through. Supposedly it fits 100 people, but I think they'd have to break a few limbs to arrive at that number.

The emergency first aid canister hung green with chains from the ceiling and was unsurprisingly empty. Not ideal for folded limbs or an underground crisis. After much shouting and poor hearing, we left the refuge bay and once more found ourselves bent-skew walking on the uneven dust before we reached chairlift 1.

On our approach we saw three guys sat slumped at the entrance. I thought nothing much at first. Just a few slackers waiting for the day shift to end perhaps. Alas, to the whole crews' dismay, chairlift 1 decided to take a long weekend, leaving an excuse of 'closed for emergency procedures'. His excuse wasn't exactly comforting, especially with the knowledge of a barren refuge bay as our only hope, what's more it being several hundred metres away. Luckily, the term 'emergency procedure' had not seemed to carry any element of haste amongst the miners and so I comforted myself based on the theory that they know best and I started the zombie trundle up to surface.

Miner's dropped like flies on the conveyor lined road as we made our way up the emergency path and summited at the surface. Laughter was shared all round and I was elbowed with the words "Free gym ey!" and "Full Virgin Active Membership today!"

* * * * *

It's been over a month since my first time underground. I get to read my account of losing my underground virginity and laugh at the innocence of it all. It's a culture and you get used to it. It appeared to

be the miner's second home, because it becomes it. You get used to the cold brace of chairlift 1 and the warm humidity beyond chairlift 4. You find yourself naively trusting the 83,000 tonnes (calculated per pillar area) hanging over your head. (Johnny and I spent part of a morning doing the calculations, as well as the equivalent number of animals that would be; if you are interested, 12,000 elephants or 830 blue whales standing proud on your decimated dust…)

What's more, the conditions experienced by those in Gold and Diamond mines are far, far worse. Burying themselves 3km deep for those 'precious gemstones' that adorn your neck and choke theirs in return. I find myself looking at jewelry shops with not a new-found respect for its cabinet's content, but with conflicted feelings; awe of the natural and those that unearth them, and disgust at the ignorant capitalist purchasing it for their ignorant partner who's private education seemed to bypass all knowledge of the inner workings of their mother's safe and beyond. But, I guess that's no way to address family and friends.

The Road to a Low Carbon Future through the Fossil Fuel Divestment Movement and the Energy Justice Framework

Aneleen de Ruiter (First Year, Management and Sustainable Development)

Abstract – **Firstly, this essay discusses the successes and limits of the fossil fuel divestment (FFD) movement. The FFD movement successfully contributes to the transition to a global low carbon future due to its size and influence, which can be seen through a shift in the banking industry, political economy, and higher education institutions (HEI). However, some sources indicate that the FFD movement has limited effects on true systemic change, especially within HEIs. Nonetheless, the FFD movement is significant as it exemplifies an attitude change from individual to widespread political action. Secondly, this essay evaluates the problems and benefits with transitioning to a global low-carbon future by considering the energy justice trilemma. Albeit with limits, the transition to a low carbon future can balance the energy justice trilemma through providing accessible, available, and sustainable energy sources.**

Introduction

After emerging in 2010, the originally student-led fossil fuel divestment (FFD) movement continued to gain momentum throughout the 21st century; currently consisting of large-scale collective action targeting the fossil fuel industry (Debski and Healy, 2017). It aims to aid the transition towards a global low-carbon future that is reliant on renewable energy sources, thereby working towards SDG7: affordable and clean energy. The FFD movement encourages divestment through reputational damage and the stigmatizing of companies using fossil fuels, pressuring institutions to sell shares from firms investing in fossil fuels (Ayling and Cunningham, 2015). The FFD movement reframes the climate discourse from the business-as-usual approach to the political and economic changes necessary to rid global energy systems of excessive carbon. This essay examines the role of the FFD movement in transitioning to a low-carbon future, as well as how a transition to a low-carbon future can align with the energy justice framework. This essay concludes that, albeit with limits, the divestment movement is an effective means of transitioning to a global low carbon future through inspiring collective action. Moreover, the transition to a low-carbon future can balance the energy justice trilemma through supplying sustainable, available, and sustainable energy.

The fossil fuel divestment movement

Successes

The FFD movement successfully contributes to the transition to a global low-carbon future due to its size and influence. This can be seen through a shift in the banking industry, political economy, and higher education institutions (HEI). Indeed, the divestment movement destroys the social license through which fossil fuel companies operate by stigmatising organisations that hold investments in fossil fuel companies. It is already the fastest growing divestment movement in history (Ansar et al., 2013) having encouraged divestment in over 1186 institutional commitments representing assets worth 14.4 trillion (Fossil Free, 2020). This has resulted in major figures and institutions such as Deutsche Bank, Governor of the Bank of England, HSBC, and many more to consider fossil fuel investments as possible stranded assets (Dietz et al., 2016). Analysts at Goldman Sachs stated that the divestment movement was a key cause for the coal industry deteriorating by 60% (McKibben, 2018). Shell has announced that the FFD movement is a "material risk" (McKibben, 2018) to the business. Christina Figueres, former UN climate chief, explains why divestment is successful: the pensions and life insurances of billions of people depend on the 'security and stability of institutional investment funds' (McKibben, 2018).

This shift is also witnessed in the political economy. Prominent political figures in the USA, such as Senators Sanders and Warren, support the Keep It In the Ground Act, a campaign started by the divestment movement to ban fossil fuel extraction on US public land (Debski and Healy, 2017). This highlights the impact of the FFD movement on the fossil fuel political economy, as well as a possible deeper paradigm shift toward greener policy. Due to the FFD movement discrediting fossil fuel investments, the movement poses a threat to these institution's investments, causing them to divest. Moreover, this shift is paralleled in some HEIs. In 2017, the University of St Andrews divested a £50 million endowment fund from companies that extract fossil fuels following a 17-month long divestment campaign (Coleman, 2017). All these noteworthy influences of the FFD movement in different sectors indicate that the movement has had significant successes.

Limits

However, some sources indicate that the FFD movement has limited effects on true systemic

change in HEIs, even though this is where the FFD originated. HEIs often practice sustainability through retaining a micro-focus on small environmental improvement (Jones, 2012) decontextualizing sustainability from broader issues, such as social and climate justice, which is key to the divestment movement. A reason for this could be that sustainable development is seen as a "bolt-on requirement" (Sterling and Thomas, 2006), something that can be incorporated with existing activities rather than integral to major structures. This is combined with sustainability's lack of concrete meaning that allows university management to present sustainability in ways that align with their agenda (Debski and Healy, 2017). As a result, HEIs can claim to be sustainable while enforcing a top-down, non-threatening bureaucratic approach to sustainability rather than making systemic changes (Jones, 2015). Debski and Healy (2017, p.714), who investigated FFD in HEIs, argue that many HEI administrations 'defended the status quo at the expense of systemic change' and as a result are often unwilling to divest from fossil fuel institutions.

Nonetheless, the FFD movement in HEIs is significant as it indicates an attitude change in students from individual to widespread political youth action (Debski and Healy, 2017). In St Andrews, this is reflected through the university's aim to reach carbon neutrality, systemic changes such as an anaerobic digestion plant and the biomass energy plant, and increased collective action like the student-led climate strikes (Environment Team, 2020). Ultimately, as stated by Bill McKibben (2018), co-founder of climate campaign 350.org, the FFD movement is a collective effort unlikely to result in direct devaluation of fossil fuel companies, but instead be 'one crucial part of a broader strategy' influencing the climate change discourse.

Figure 1: The energy trilemma (Figure is based on McCauley's Energy Justice Framework (2017) and made by the author)

Transitioning to a global low-carbon future

To evaluate the fossil fuel divestment movement as a means of transitioning to a low-carbon world, the problems and benefits of transitioning need to be considered. This will be done through the energy justice framework in order to consider the social and environmental rights within energy availability, accessibility, and sustainability (McCauley, 2017, p.2), as illustrated in Figure 1. The energy trilemma must be rebalanced as the current high-carbon energy system does not ensure energy justice. Although there are other significant renewable sources such as solar and nuclear energy, the focus will be on hydropower and wind energy to ensure an in-depth analysis.

Sustainability

In relation to energy politics, sustainability can be defined as "the reduction of carbon emissions to an acceptable level" (McCauley, 2017, p.7). In order to not breach the Paris agreement limit of 2°C, preferably 1.5°C, CO_2 emissions must effectively be stopped. To ensure energy justice there must be a transition from fossil fuels to renewable resources. Hydropower is a viable option, already supplying 71% of global renewable energy (McCauley, 2017, p.53). Wind energy could also be a major component in the transition to a global low carbon future; realistically, it is able to supply 20% of the global energy by 2030 (WEC, 2017).

However, these positive effects and viability of wind and hydropower are debatable. According to Fearnside (2016), who studies the impacts of dams in Brazil, dams can have negative impacts on indigenous communities, such as population displacement and loss of fisheries, which are often a main source of livelihood. They can also negatively affect ecosystems through flooding and biodiversity loss. Moreover, although hydropower supplies a large portion of the renewable energy, renewables currently represent 15% of the world's total energy supply (U.S. Energy Information Administration, 2019) making it questionable if this transition to renewable energy is viable in the short-term. Similarly, although a viable option, significant wind power generation remains concentrated in a "handful of countries" (IRENA, 2019b, p.5). Nonetheless, the energy sourced from hydropower and wind energy is increasing rapidly (Hoes et al., 2017) indicating a positive long-term outlook for sustainable transition.

Many sources also claim renewable energy has a positive effect on employment. Meyer and Sommer (2016) investigated the economic effects of transitioning to a low-carbon economy and found that a majority of the investigated scenarios show positive

net employment effects. However, Lambert & Silva (2012, p.4673) indicate 'there is no single clear result' about the positive or negative effect of renewable energy on employment. Overall, these findings do indicate that a sustainable transition to the low-carbon future that the FFD movement fights for is possible. However, in order for the energy transition to be truly sustainable, these negative impacts have to be thoroughly managed and the positive impacts should not be overestimated.

Availability

The politics of availability needs to be considered so the transition to renewables does not endanger basic global energy requirements. Enough resources need to be secured to meet the demands of rapidly expanding economies, such as China and India (McCauley, 2017). The politics of energy availability are a balance between net exporters supplying enough for themselves and other countries, and net importers continuing to demand energy (McCauley, 2017). The divestment movement can cause problems in energy security; if the demand for fossil fuels decreases due to divestment and transitioning away from fossil fuels, this could negatively impact net exporters.

However, hydropower could rebalance the trilemma as it generates electricity consistently and, theoretically, is not limited geographically resulting in a higher capacity factor than wind and solar energy allowing countries to produce their own energy. Although wind energy is less reliable than hydropower, the sector has higher growth rates with off-shore wind farms becoming increasingly economically viable (IRENA, 2016). The US energy Information Administration (2019) expects wind power generation to annually grow 12-14% in the coming years, and IRENA (2019a) predicts it will supply over a third of renewable global energy by 2050. However, Bryce (2018) states that "wind energy's expansion has been driven by federal subsidies". Yet, the future remains promising: in the UK, record-low subsidy deals have fallen below market price and wind energy will bear no extra cost on consumers (Ambrose, 2019). Albeit with limits, these findings do indicate it is possible to transition to the FFD's ideal low-carbon future, while simultaneously ensuring energy is available to all.

Accessibility

The politics of accessibility are significant because to ensure a just transition citizens, not just industries, should have access to affordable, reliable, and sustainable energy. Access to energy is key to eradicating energy and fuel poverty as 1.2 billion people in the world do not have access to energy (IEA, 2016) causing cooking fuel and heating shortages, thereby contributing to premature deaths and other health issues (McCauley, 2017). Affordability is an accessibility problem when people who could physically be connected to the grid do not have the financial means.

Hydropower does require high initial and moderate operating costs. However, as with wind power, more long-term structural investments yield a higher Levelised Cost of Energy (LCOE). This is why in China, which has greatly invested in hydropower, the LCOE is US$28 per megawatt while in the US the LCOE is US$120 (IRENA, 2016). Similarly, nations that greatly invested in wind energy such as China, North America and Brazil boast a LCOE of one third of new investors, such as India (IEA, 2015). Although positive, this could hinder a global transition as it makes it difficult for countries that are starting to invest in renewable energy. However, this could possibly be overcome through an initial investment such as government subsidies or micro-loans for community grids. Once the ball of the transition starts rolling, renewable energy prices will continue to decrease. The FFD movement can aid in this through encouraging divesting from fossil fuels and investing in renewables enabling this price decrease, and thereby the transition to an accessible low-carbon future.

Conclusion

Alongside the energy justice framework, the FFD movement is an effective means of transitioning to a global low-carbon future due to its size and influence, which can be seen through a shift in the banking industry, political economy, and higher education institutions (HEI). Although not all HEIs embrace the FFD movement, as they often see sustainability as something that can be incorporated in their current activities rather than integral to their operations, the movement has prompted numerous institutions to divest from fossil fuel companies through collective action. Albeit with limits, the transition to a low-carbon future can balance the energy justice trilemma of sustainability, availability, and accessibility. Ultimately, the road to a low-carbon future will not be easy and will involve a combination of parties and strategies. Through focusing on divestment as one strategy to achieve this carbon-free future, the FFD plays a significant part in enabling the energy transition.

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Disinvestment movement on fossil fuels

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***Abstract* – There is an urgent need for industries and countries to become fossil-free and switch to renewable energy sources. This essay focuses on the disinvestment movement of fossil fuels and the degree to which it can effectively help us transition to a low-carbon future. It will also shed light on how one cannot depend on this movement alone to cut our carbon footprint as several other factors play an equally crucial role in this transition. Using examples, I will highlight the importance of foregoing fossil fuels and consider nations using renewable energy for their local economic development. I will then discuss the lack of education and awareness amongst Level 1 and Level 2 countries on the Roslin's scale of the concept of renewable energy, and how unequal availability of renewable energy sources can be overcome. I will conclude by discussing how a low-carbon future can be successfully achieved by focusing on various viable solutions through the combined efforts of government regulation and individual action.**

The disinvestment movement on fossil fuel refers to strategies designed to encourage the withdrawal of existing investments from fossil fuel-related industries, as well as discouraging new investments and actions from promoting and supporting the investment of funds to alternative or more "climate-friendly" industries, such as renewable energy and energy efficiency (Alexander, Nicholson & Wiseman, 2014). In 2011, around a dozen Swarthmore students launched the very first campaign to disinvest from fossil fuels. Since 2012, nearly 1,000 divestment campaigns have been launched at universities, cities and religious institutions across North America, Europe and Australia (Leber, 2015). This movement also claims that fossil fuel companies should turn into sustainable energy companies and efforts are being made to diminish the lobbying power of oil, gas, and coal industries on climate regulation by undermining their access to finance for further development projects. Disinvestment from these companies would help keep a substantial amount of fossil fuels underground (Ritchie & Dowlatabadi, 2014).

I will now discuss the three main problems that make it difficult for industries to give up fossil fuels, but accompany it with evidence of the positive impacts that the disinvestment movement would have on these industries. Firstly, major setbacks and losses are involved for workers and communities whose livelihood depends on consuming fossil fuels across the world. Secondly, it is estimated that with the rise in renewable energy sources, fossil fuel industries will foresee a fall in profits as it is estimated that in the near future renewable energy will become cheaper than fossil fuel. An analysis by the Carbon Tracker Initiative, a climate finance thinktank has found renewable power to be a cheaper option than building new coal plants in all large markets including Australia, and is, therefore, expected to cost less than electricity from existing coal plants by 2030 at the latest (Morton, 2020). The third relates to employment opportunities and economic growth. Research suggests that economies will face higher energy costs when forced to cut down on their fossil fuel supplies. It will, therefore, become more expensive to operate the infrastructure that drives all economies forward (Polychroniou, 2018). However, these problems can be solved through the adoption of a Green New Deal proposed in the USA to combat climate change and greenhouse gas emissions, reduce inequalities, and to help generate twice as many jobs than fossil fuels do. The issue of a loss in profits may be important for the fossil fuel industries. However, these industries need to understand the urgency of the situation to make this shift, irrespective of incurring losses, as eventually they will succeed in making the transition towards a low-carbon future.

One crucial aspect that begs the attention of governments and campaigners alike, is the inequality of the availability, knowledge, and awareness of renewable energy sources. There are countries that are oblivious to the concept of renewable energy and its advantages of a cleaner environment with lesser health risks such as lower respiratory infections, heart diseases and strokes. This predicament cannot be tackled by the disinvestment movement or market deregulation alone, but also education and awareness. It is important to strategise and focus on getting Level 1 and Level 2 countries on par with Level 3 and Level 4 nations in terms of awareness and availability of renewable energy resources. It is imperative that we minimise our usage of fossil fuels, as is illustrated by the example of two primary contributing industries: the transportation and animal industry. In industrialised nations, with the reduction of the usage of cars by a single individual, 2.5 tonnes of carbon dioxide can be saved, which is about one-fourth of the average yearly emissions (9.2 tonnes) contributed by each person (Leary, 2018).

On the other hand, after fossil fuels the food industry, especially the meat and dairy industry, is one of the most important contributors to climate change. Halving one's intake of animal products can reduce a person's carbon footprint by more than 40% and consequently impact the dairy industry as a whole. There is however a distinct difference in emission intensities between regions: generally, the emission intensity of milk production is lowest in developed dairy regions (ranging between 1.3 to 1.4 kg CO_2 eq. kg fat-and-protein corrected milk in 2015) while developing dairy regions such as South Asia, Sub-Saharan Africa, West Asia and North Africa having higher emission intensities (ranging between 4.1 to 6.7 kg CO_2 eq. per kg fat-and-protein corrected milk in 2015). It is, therefore, essential to provide the same resources to all nations (FAO, 2010).

Forms of renewable energy sources, namely wind and solar energy, are extensively used as alternatives in some parts of the world while not in others, and this is precisely what needs to be addressed in order to eradicate inequality. Germany, Sweden, Uruguay and China are among the few countries that are using renewable resources of energy and are eliminating the use of fossil fuels all together (Climate Council, 2019). Even though the wind and solar industries are expanding, they are still smaller in comparison to the fossil fuel industries. To change this, significant steps need to be taken, such as subsidising renewable energy sources globally or increasing the price of carbon which could eventually help change the political economy of renewable energy. However, this requires government support in terms of employment and domestic technological progress; both of which require direct interventions with international trade flows (Lewis, 2014). Around the world, governments are increasingly aiming to prioritise the development of renewable energy technologies. In turn, this has led to an expansion of the global supply chain leading to an increase in the international trade of renewable energy technologies that results in increasing trade-related disputes.

On a positive note, a new report by the International Renewable Energy Agency (2018) found that onshore wind and solar photovoltaic power are now less expensive than any fossil-fuel option. Fossil fuel generation today costs between $0.05 - $0.17 per kilowatt-hour in G20 countries (Leary, 2018). By 2020, however, renewables are expected to cost $0.03 -$0.10 per kilowatt-hour, with the price of onshore wind power and solar photovoltaic projects expected to be as low as $0.03 per kilowatt-hour by 2019. Offshore wind projects and solar thermal energy too are expected to drop in price between 2020 and 2022 to $0.06 - $0.10 per kilowatt-hour (ibid). According to an analysis conducted by Carbon Tracker, it is cheaper to build new renewables than to build new coal plants in all major markets today, including Japan, the USA and Russia. Furthermore, over half the existing global coal fleet is more expensive to run and maintain than building new renewables (Roberts, 2020). In certain parts of the world, one can already see efforts being made towards this transition. For example, in 2018, Britain began generating twice as much electricity from wind than coal, which contributed to 2017 being the greenest year ever for the United Kingdom (Leary, 2018).

Overall, renewable forms of energy such as the wind and solar industries are still nascent compared to fossil energy forms, and there is still a long way to go before everyone can equally rely on them. Measures need to be undertaken at all societal levels to make individuals more careful and aware of their actions as a collective effort is the key to a successful transition. Democratising renewable energy will lead to the mitigation of problems such as air and water pollution, excessive water and land use, wildlife and habitat loss, damage to public health, and global warming (Luderer et al., 2019). Therefore, there is an urgent need for this transition to take place through the disinvestment movement, and the spreading of awareness through knowledge and education globally.

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Spiritual Practices and Indigenous Knowledge: Possible Auxiliaries in the Pursuit of a Sustainable Society

Lea Fourchault (Second Year, Biology and Sustainable Development)

Abstract – **Sustainable Development is a fairly recent concept in the Western World and is usually associated with pragmatic political and economic measures. Contrarily, elements of sustainability have been present in spiritual practices of indigenous peoples for centuries. This paper will highlight how and why faith-based practices and indigenous knowledge offer crucial insights into the successful transition towards a sustainable society. To do so, an in-depth exploration of Maori traditions and beliefs will emphasize the relationship between learning, knowledge, and emotion as a necessary path to establish a connection with the natural world, including people. This will then briefly be contrasted with how other faiths, especially the American Evangelical Church, can hinder such a transition toward sustainability.**

Introduction

The current secular information channels tend to under- or misrepresent indigenous knowledge and faith, either portraying them as obstacles to a scientific resolution of climate change and its effects, or not mentioning them at all (Roosvall and Tegelberg, 2013). The aim of this paper is to argue that Traditional Ecological Knowledge (TEK), faith and spiritual practices have a role to play in the pursuit of a sustainable society. They allow for an emotional understanding and bonding with other people and the natural world – which kindles long-term commitment (Brown and Pickerill, 2009), meaningful socio-political attitudes, and fulfilling cultural practices that enable sustainable relationships within that society, including the natural world (Robinson, 2011). In the first part, an exploration of the Maori cosmogony will highlight how traditional knowledge translates through spiritual practices into social and environmental wisdom, hence leading to sustainable practices. The role of religious networks will be further examined as a positive, pro-active alternative to fragile secular institutions in the Pacific Islands, insofar as they help provide material and socio-spiritual support to strengthen resilience in this vulnerable location. As a contrast, the issue shall be raised that TEK and faith might nonetheless slow down urgent action by sustaining misinterpretations or denial of one's role as both a part of the problem and the solution to tackle unsustainable living patterns. To do so, brief examples of the Aymara people and an Evangelical community in the USA shall be explored.

In Maori culture, spiritual practices are a crucial link between knowledge and wisdom. They allow the individual to develop an emotional bond to their observations and knowledge of their surroundings leading to a respectful, caring, and meaningful relationship to other people and the natural world. After a brief summary of the 'three baskets of knowledge theory' in Maori cosmogony, the importance of spiritual rituals to achieve 'matauranga' will be underlined. This concept suggests that the quest for knowledge is concluded by the transformation of the latter into wisdom through the symbolic swallowing of a white stone, 'Hukatai', and a red stone, 'Rehutai', when entering the house of 'Wananga' (Marsden, 1992).

Maori have a three-worlds view symbolized by the three baskets of knowledge. Two of these worlds have direct connections with the sustaining of life: Tua-Uri is the world of rhythmical energy patterns, which is behind the world of sense perception called 'Te Aro-Nui'. Tua Uri's pure energy 'Hihiri' sustains and replenishes life in the natural world, and radiates from all beings. 'Mauri' is the force that knits the elements creating diversity and unity; 'Mauri-Ora' is the life force, while 'Hau-Ora' is the spirit infused in all animate life. Humans are an integral part of this fabric, equal to all other living beings (Marsden, 1992). In order to make sense of this knowledge, Maori believe it must find a center. In other words, the accumulation of facts in one's head, which constitutes knowledge, needs to be integrated in one's heart, or emotional center, in order to achieve its purpose: to be transformed into wisdom. Therefore, spiritual practices of swallowing 'Hukatai' and 'Rehutai' are a fundamental part of acquiring wisdom. As Marsden (1992) explains, these rituals parallel the symbolic voyage of a canoe, which encapsulates this transformative process. Indeed, the sea foam 'Hukatai' generated at random by the motion of the canoe symbolizes the gathering of facts in one's head during one's pursuit of knowledge; it is only by directing the canoe towards the sunrise that 'Rehutai', or sea spray, becomes red through the illumination of the sun. This deeply spiritual experience of integrating one's knowledge inside one's emotional center, as a canoe facing towards the sunrise, acts as a catalyst

to create wisdom.

This mystical bond to wisdom allows for a long-lasting respect shared by Maori community members for the values and customs derived from it (Marsden, 1992). Customs such as 'kaitiakitanga' are still practiced today. The etymology of this concept reveals its essence: 'Tiaki' means 'to guard', and the prefix 'kai' designates the person doing the action: 'kaitiakitanga' hence evokes a personal commitment to take care of the natural world. In fact, 'kaitiakitanga' is both a custom and a way of understanding the natural world as an integral part of one's identity and 'mana' (status). This spiritual understanding of nature shapes Maori culture and social interactions, notably through 'tapu' (taboos) and 'rahui' (temporary restrictions) that help nature regenerate. For instance, the Ngai Tahu tribe use the 'hakuai' bird as a natural 'rahui'; when the 'hakuai' calls in the night, the season for harvesting 'Titi' (muttonbird) comes to an end, and the 'rahui' remains until the opening of the next season (Garven et al., 1997). Similarly, no bird snares are used in breeding season, and recreational fishing and birding are banned as this is a taboo – the underlying principle being to harvest no more than what is needed for one's wellbeing. A further illustration of a custom creating meaningful relationships is 'manaakitanga'. Indeed, as 'kaitiakitanga' illustrates care and respect for the natural world, 'manaakitanga' encapsulates Maori generosity and hospitality towards guests. This concept is of such importance that the Government of New-Zealand recognizes it as one of the two core values determining its tourism strategy. A third custom derived from this spiritual understanding of alterity, which is dear to the Te Arawa tribe, is 'Te Hunga Kiati'. As Mihinui (2002) states it, 'Hunga' means 'communal purpose and responsibilities', which combined with 'kiati' invokes the obligation to respect and protect any form of alterity within the community's 'mana whenua' (customary authority over a territory). All these customs encapsulate the Maori's way to link knowledge and wisdom (i.e., implicitly integrating sustainability in their values) through spirituality, which confers a sacredness to the relationships they entertain with other humans and with the natural world.

Moreover, the Maori worldview has been officially recognized by the New-Zealand government, for instance in the Resource Management Act of 1991, and in the Foreshore and Seabed Act of 2004 stating that 'kaitiakitanga' must be taken into account in all management plans (Royal, 2007). While merely being a first step toward reconciliation, the appeal of mingling Maori TEK and 'western' legal requirements is dual: Maori may feel like they meet their responsibilities and the hopes of their ancestors, while non-Maori may reflect on their own relationship with nature and people and how to promote respectful relationships with both. Nonetheless, in many areas of the world, secular institutions fail to apprehend the importance of spirituality in the promotion of 'wise' or sustainable practices. The importance of religious networks is highlighted in such situations, in which religious leaders and communities provide both objective and subjective support in the building of sustainable and resilient societies.

As underlined by Haluza-DeLay (2014), national governments are perceived as distant by many inhabitants of the Pacific Islands, which is why spiritual organizations such as churches play a major role in local cultures and authority systems. Indeed, churches provide objective support; both in the short term as shelter in the case of natural disasters or material and social resources for local projects, and in the long-term by enhancing island resilience, for instance by providing disaster or climate education programs or by raising international awareness about the Pacific Islands. This is made possible by their unique structure: through regular meetings and spiritual practices churches have established a very strong bond with local communities. In the Solomon Islands, for example, churches are present in every community, even the most remote (Haluza-DeLay, 2014). A study of students attending the University of South Pacific, by Nunn et al. (2016), finds that as many as 80% of them (originating from 12 different locations, see figure 1) attend religious services regularly, 90% of them at least weekly, and a large part (30%) more than once a week. As Nunn et al. (2016) suggest, the failure to take into account this exceptional strength of faith and religious practice in the Pacific Islands explains

Figure. 1: Map of the Pacific Islands region, showing the part served by the University of the South Pacific (Nunn et al., 2016).

the failure of many projects that are aimed at promoting sustainable practices. Understanding the impact of local religious networks is henceforth essential to cooperate efficiently with Pacific Islanders on a local scale.

At the same time, churches are part of an overwhelmingly wide network, cooperating at transnational levels and with various governments and NGOs. In Samoa, for instance, the Red Cross used the Christian Church network to deliver education programs regarding climate and natural disasters. Similarly, Haluza-DeLay (2014) describes how Caritas (a Catholic NGO) cooperated with the Catholic Coalition on Climate Change to organize international screenings of the documentary Sun Come Up, which narrates the exodus of the Carteret Islanders - to which the Catholic church of Bougainville offered 85 hectares for relocation. This commitment is encapsulated in the Moana Declaration (2009), initiated by the Pacific Conference of Churches, through which individual churches and their representatives raise awareness about climate change and its effects, and offer relocation possibilities for inhabitants of the most vulnerable locations (Nunn et al., 2016). Therefore, churches manage to provide an efficient objective support to Pacific Islanders in their daily confrontation with the effects of climate change with the help of a strong transnational network, which national governments often lack. This in turn allows the islanders to shift their capabilities to long-term improvements in their personal and communal projects, hence allowing them to pursue sustainability in their society.

Furthermore, the regular spiritual practices provided by these networks allow for a subjective, emotional support that increases the feeling of connectedness with people, and – from a theological viewpoint - with the Creator and his Creation, i.e. the natural world and all its inhabitants. In his world wide analysis of indigenous peoples' spirituality and TEK, Royal (2002) suggested that feeling connected to the world was the predominant ontological and epistemological concern, be it in Maori, Hawai'ian or Native American worldviews. Considering the mingling of Christian faith and indigenous spiritual practices in the Pacific Islands, it appears that the feeling of gratitude resulting from the connectedness to the Creator and the Creation is a major part of the inhabitants' spiritual well-being. This feeling of gratitude is an essential socio-cultural gradient. Indeed, according to Emmons and McCullough (2004), gratitude is at once a moral barometer, motivator and reinforcer. This creates a virtuous circle of positive emotions, which according to the Broaden-and-Build Theory (Emmons and McCullough, 2004) increases people's thought-action repertoire, i.e. their physical, social, intellectual and spiritual behaviors are diversified leading to patterns of creative exploration, achievement and attachment. This is especially useful in the perspective of long-term commitments - for instance regarding climatic resilience-building projects - where these behaviors play a major role (Brown and Pickerill, 2009). As Brown and Pickerill (2009) further suggest, positive emotions participate in the creation of collective identities, because of the effect felt towards the other group members. This effect then again creates a virtuous circle of pleasurable interactions increasing affect, increasing pleasurable interactions, and so on. Therefore, spiritual practices - indigenous or monotheistic - create virtuous circles of affect and care because of the feeling of gratitude which arises through connectedness with the Creator and the Creation, and with members of one's community. As highlighted above, this favors long-term commitment and emotional stability, both of which are essential to the building of sustainable societies.

Nonetheless, it matters to acknowledge that both TEK and spiritual practices can have deleterious effects, and indeed be obstacles to the global pursuit of sustainability. It is widely recognized that the Evangelical Church of the USA favours discourses denying anthropogenic climate change, which have notorious impacts on believers' consumption patterns and lifestyles (Haluza-DeLay, 2014). According to Haluza-Delay (2014), environmental awareness faces four types of barriers in these faith groups: paradigmatic barriers, such as 'imminent end-of-time' theologies; applicability barriers, where funds are more likely to go to disaster relief than disaster prevention; social critique, where issues may be thought to be provoked by individual immoral behaviors rather than deep-rooted social inadequacies; finally, convictions - and the lack thereof - that lead to strong attachment to sometimes deleterious behaviors. Faith groups such as the Christian Cornwall Alliance play with and reinforce these barriers, claiming for instance that investing in climate mitigation equals cutting down disaster relief funds, when in fact it may help diminish the necessity of the latter (Haluza-DeLay, 2014). Equally, TEK and indigenous spirituality can lead to superstitious behaviors that slow down the acceptance of sustainable practices (Roosvall and Tegelberg, 2013). The Aymara people of the Andean region, for instance, believe that raining patterns and fertile soils are a gift from Pachamama, who is Mother Earth. When the rain failed to water the crops on

time, they assumed they made incorrect offerings to Pachamama. A water engineer had to convince them that it was climate change, instead of Pachamama that determined the rainfall - which rendered all offerings futile (Roosvall and Tegelberg, 2013). If these examples arise at very different scales, the Aymara's behavior will affect their community solely, while the Evangelical church may affect the behavior of millions of believers worldwide; both highlight that faith and spiritual practices come with superstitions and erroneous beliefs. These create mental barriers against the acceptance of anthropogenic climate change and unsustainable lifestyles. This is a major obstacle towards the building of a sustainable society, making the very pursuit of it a blasphemous lack of trust in God or Mother Earth. In fact, this perspective highlights the strength of spirituality and the profound effect it has on values, behavior and identity at individual, community, and transnational levels.

In this respect, spiritual practices and faith can be understood as dynamic processes through which meaning and emotions are attached to knowledge. Regarding the pursuit of purposeful and fulfilling relations with other humans and the natural world, two elements are of importance: the worldview with which any faith or spirituality is combined; and the latter's capacity to include different approaches. Materialism and individualism may be combined with many different faiths without promoting sustainable practices, and sometimes even justifying unsustainable behaviors. On the contrary, as the Maori culture exemplifies, spirituality combined with a holistic worldview and a sense of connectedness to Nature can lead to an emotional understanding of TEK, generating long lasting customs of care for the natural world (kaitikitanga) and humans (manaakitanga). A further important impact of religious practices is the creation of strong local and international networks and communities that help provide the necessary material means to relieve people from stress factors in vulnerable environments. At the same time, spiritual practices help the creation of virtuous circles of positive emotions and strong collective identities, allowing for the emotional stability needed for the successful completion of long-term commitments. Therefore, it appears that the combination of TEK and spiritual practices is an auxiliary in the local and global pursuit of a sustainable society, while faith and spirituality merged with individualism or capitalism may prevent or slow down the changes in lifestyles that are needed to achieve this aspiration.

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Familial behaviours and personal food waste in relation to food waste discourse

Meggie Beattie (Second Year, Biochemistry)

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Breakfast	Banana Rice puff cereal peanut butter, almond milk, slice of toast	Apple Soy yogurt 2 slices of toast	Piece of toast Teaspoon peanut butter 2 bananas 2 oatcakes	2 slices of toast 2 bananas 1 tbs peanut butter and seeds	Porridge with frozen fruit and almond milk	Rice puff cereal with 2 bananas and a tbs peanut butter	3 apples soy yogurt and a fruit bar
Lunch	Vegetable and pasta salad Pasta stored in fridge for later	Sandwich with humous, rocket and cucumber	Carrot sticks Banana 1 pack of oatcakes	Rye bread Carrot sticks Apple	Cucumber, pearl barley, super snap pea salad	Couscous with mushrooms humous and rocket	Vegetable pasta and a dried fruit bar
Dinner	Pasta with peas, humous and mushrooms	Leftover pasta from yesterday with carrot sticks and humous	5 slices of rye break 5 apples	Vegetable Pasta 2 apples	Left over salad and leftover pasta	2 apples, yogurt	Oatcakes and humous with cucumber
Snack	4 apples, raisins	Apple raisins 1 pack of oatcakes	1 banana	3 squares dark chocolate	2 apples	1 apple	2 apples

Figure 1. A record of personal eating behaviours over the course of a week; all were supermarket bought food prepared at home

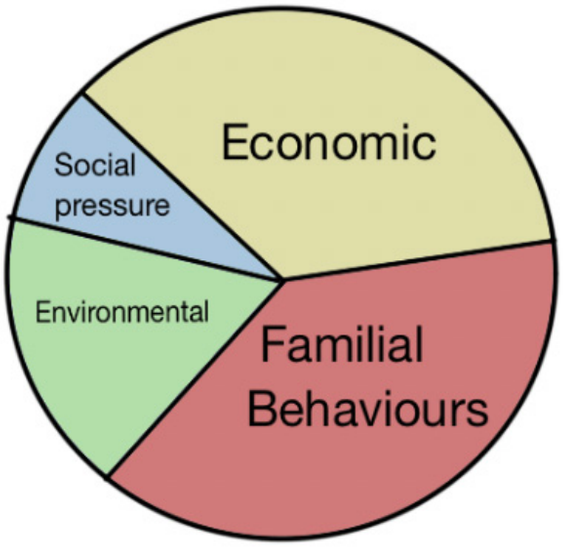

Figure 2. A visual representation of influences in my food waste behaviours

Impact and prevalence of food waste

Food waste is not a widely discussed topic; yet, it is of tantamount importance and has been recognised as so on a global scale, such as through sustainable development goal 12 which states to "ensure sustainable consumption and production". Waste and Resources Action Programme (which operates as WRAP) (2009) is a registered UK charity who estimated that in the UK 8.3(±0.3) million tonnes of food and drink are wasted by households each year. This is equivalent to over 6 kg per household per week putting into perspective the magnitude of the problem that most are unaware of. It is also believed that one third of the edible parts of food destined for consumption are wasted worldwide (Gustavsson et al., 2011). Furthermore, the general public are unaware of the multiple negative aspects of food waste, such as social, economic and environmental side effects which can impact their lives directly (Graham-Rowe et al., 2014). The synthesis of such statistics, academic writings, and policy ideas have made evident the importance of researching food waste. Using Graham-Rowe et al. (2014) as a framework, this essay will examine the food waste behaviours of both myself and my mother, and discuss the tropes within academia that parallel such behaviours.

Personal food waste minimisation behaviours

For the duration of a week, I recorded what I ate as well as my food waste (Fig. 1) meaning I was able to get a more accurate picture of my food waste,

habits, and reasons for the amounts I wasted. For the whole week the only food waste I accumulated that would be considered culturally edible in the UK were two carrots and a few strips of cabbage; the inedible food waste rarely stocked up beyond onion skins and apple cores. One particular point of interest is how cultural norms play a part in our food consumption and waste behaviours (Melbye et al., 2016). An example of this is how when eating apples I fit myself into cultural norms in the UK: when in private I eat the whole of the apple including the core, whereas in public I wouldn't do so as it is not socially acceptable. When looking at the food waste diary and Fig. 1, I recognised that in the context of university students I waste little food. The reasons I believe this is the case are as follows: I am self-catered and diligent in eating self-prepared food (the reasons for which being more economical than environmental). This behaviour was made clear with the data in Fig.1 as all the food I consumed that week was self-prepared. Most meals I prepare involve at least one leftover from another and I plan ahead with my meals knowing when I will have time to cook. This is a good waste minimisation behaviour that was identified in both Graham-Rowe et al. (2014) and Cannellini & Parsons (2012). As can be seen in Fig. 2, why I have these behaviours and habits can only be rationalised within the context of my family, environmental preoccupations, and economic concerns (Graham-Rowe et al., 2014).

Food waste motivations

Graham-Rowe et al. (2014) explores household waste and familial influences in her study creating a conclusive and helpful framework to help examine the personal familial food waste behaviours. In the example of personal food waste behaviour, while a lot of my motivation for food waste preservation is environmental, which is a legitimate concern (Doron, 2013), it also cannot be denied that my motivations are based in economic concerns. Though, it appears this is a majority case; multiple studies found that environmental impact is not people's biggest concern (Lyndhurst et al., 2007; Quested et al., 2013) with the most common reason for food waste minimisation being finance based (Graham-Rowe et al., 2014).

Spheres in food waste literature, such as Stuart (2009), want to shift this focus to ensure that people's concerns for food waste aren't solely financial. While there has been little tangible success so far, campaigns such as 'Love Food, Hate Waste' have tried to increase awareness. Factors and behaviours can, therefore, be observed to be nuanced but also widely the same within general reasoning, with much of my behaviour and that of my family falling into these academic tropes.

Familial behaviour & academic tropes

A disparity exists between food waste behaviours I practice at home and at university. I believe much of these behaviours have been influenced by my familial background. The idea of "the good provider" is common in academic literature surrounding food waste and is a key thought theory in barriers to food waste management (Graham-Rowe et al., 2014). Indeed, this approach highlights that parental figures (commonly mothers) have differing motivations, which can revolve around either providing an abundance or "healthy" food for people they care for often in their household (Graham-Rowe et al., 2014). It is a theory that parallels my mother's behaviour as she frequently over-buys and over-prepares. While there are many ways she fits this identity, being a provider when family or friends are at home are the most prominent. My mother often hosts dinner parties and overbuys food; this is a key behaviour in the provider identity (Graham-Rowe et al., 2014; Cannellini & Parsons, 2012). Furthermore, as I changed behaviour toward veganism, my mother would buy unnecessary food as a way to feel she was providing for me while she was no longer cooking for me. These foods often went to waste; nonetheless, her behaviour persisted. As identified by Evans (2011, 2012), providing abundance can be a way to symbolically display protection over someone, and the behaviours that resulted from that often seem irrational but justified to them in their motivations. Nevertheless, my mother and I have a thrift mindset when it comes to food, choosing to use leftovers over cravings and personal preferences. An example of such being bubble and squeak, a dish my mother does not favour, but will still cook and consume when there is leftover mashed potato. This idea of thrift and sacrifice in families is key in Cannellini & Parsons (2012):

> 'putting the likes and dislikes of other family members first, it was often the mother who ended up consuming leftovers in order that other family members might enjoy fresh food'

The motivations and actions of food waste behaviours are complicated and heavily influenced. My mother's behaviour works as a useful example of the contradiction, complications, and tropes food waste behaviours can be put in.

To a partial extent food waste can be blamed on ignorance around sell-by dates, food storage, transportation, and preparation. This was identified in

Graham-Rowe et al. (2014) and could be used to further help explain my low food waste. My mother previously owned a café; while this was often unhelpful in relation to food waste as she tended to make large proportions of what she did cook, it did mean that she instilled knowledge of preparation and preservation of food into my habits that many other university students lack. My previous experience in working in the hospitality industry is likely to have aided in this knowledge as well. The need to educate people on food preparation, leftovers and waste minimisation is paramount. By having greater knowledge of why people do the behaviours they do, as well as the effect they have, we have a much greater chance of enacting change. (Cannellini & Parsons, 2012; Doron, 2013; Graham-Rowe et al., 2014).

Conclusion

Many factors affect why individuals have the food wasting behaviours they do, but while reflection and understanding are important, it is imperative that going into the future there is a focus on how to reduce it and the correct mechanisms for doing so. While my familial background has heavily affected my food waste behaviours, my mother and I have very different waste outputs with her following the trope of the provider and myself having an almost impractical focus on self-catered food. When looking at the changes in my behaviour between home and university, it could be suggested that due to familial influence and financial incentive, I tend to waste less. Despite thrift behaviours influenced by financial incentive, it can be said that reductions in food waste may not translate from the sacrifice, often of mothers, in consumption of leftovers. By analysing the factors that I believe affect my food waste behaviours (Fig. 2), it can be seen that food waste is a complex issue which involves both sociocultural and material factors, meaning its solution will be no less complex (Hebrok & Boks, 2017). Analysing my own behaviours and those of my family in this context, and that of the study by Graham-Rowe et al. (2014), has enabled a better connection to the concepts at the forefront of food wasting behaviour, while also providing a real-life personal example of these concepts and why they may take place.

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En Camino

Alexandra Weiler

General Introduction

Between December 2019 and January 2020, I spent three weeks in Pamplona, a rural town in Colombia close to the Venezuelan border. Having grown up with a Colombian mother abroad, I have a personal connection to socio-economic inequalities and political frustrations regarding the on-going peace-process, visible in disruptive and large protests around the country (DW, 2020). One issue of major concern to Colombians has been the rapid influx of Venezuelan migrants into many different parts of Colombia. From conversations with family friends, drivers and students living in Bogota, they add additional pressure to an already overstretched health system and have been linked to increased homelessness on the street and a devaluation of Colombian workers. This has created social resentment in certain parts of Colombian society, but also goes to show the economic desperation that Venezuelans are experiencing.

In June, the United Nations High Commissioner for Refugees (UNHCR) estimated that number of Venezuelan migrants had surpassed four million, making Venezuelans 'one of the single largest population groups displaced from their country' (UNHCR, 2019). In recent years, Venezuela's economy has experienced hyperinflation, leading to an economic collapse that has affected Venezuelans from all walks of life. According to the International Monetary Fund (2019), average inflation rates for the bolívar surpassed 500,000% in 2019. Effectively, this means that a person living off a monthly minimum-wage salary cannot afford to buy a carton of eggs (De Haldevang, 2020; EFE, 2019). Many caminantes (Spanish for 'the walkers'), tell stories of empty shops, shortages of food, medicine and fuel. One caminante, who had just finished his studies before the economic collapse, described Venezuela to me: 'Venezuela resembles a dessert. Only old people are left, shops are closed. There is nothing left there.'

The main migratory route to Colombia goes from Cucuta, through the Andes to bigger cities in Colombia or further south into Ecuador and Peru, sometimes even to Bolivia and Chile. Pamplona, where the photos below were taken, lies 80km from the Colombian-Venezuelan border point in Cucuta, the total elevation change is over 2,000 metres upwards. The route continuing from Pamplona through the Andes is continuously dangerous and difficult due to a combination of environmental and socio-political factors. To reach the next shelter from Pamplona, caminantes have to walk the Páramo de Berlin (3600m elevation ASL), a walk that takes an average migrant between 20 and 30 hours on foot. Frequent causes of death along the migration route are attributed to hypothermia. The windy mountain highway, frequently used by large trucks, poses another danger. Last Autumn, a caminante got hit by a car only meters away from the shelter I stayed in, leaving her fatally injured. Socio-political risks stream from a strong presence of a communist-catholic guerrilla group, the National Liberation Army (ELN). With the disarmament of the Revolutionary Armed Forces of Colombia (FARC) in 2017, formerly Colombia's largest guerrilla group, power vacuums formed. The ELN has since then been moving into territories formerly controlled by the FARC and has been reported to have a network extending even into Venezuela (Parkin Daniels, 2019). While I do not wish to speculate about the intentions of the ELN with regards to the Venezuelan migrants, I hope to show that violent, armed groups control many of the mountainous regions through which vulnerable people migrate on a daily basis (Parkin Daniels, 2020).

Much of the humanitarian aid in Pamplona sustains itself through Colombian organisations and a number of volunteers from Venezuela and Colombia. Locals describe their help as living God's mission and are thus willing to sacrifice personal time and resources. Christian 'love of neighbour' motivates the great majority of the volunteers I met during my time in Pamplona. All photos were taken in Douglas' Shelter, one of the three shelters operating in Pamplona out of locals' initiative to support the millions of migrants walking through their hometown. I hope the photos below can help raise awareness about this humanitarian crisis from the perspective of a shelter volunteer.

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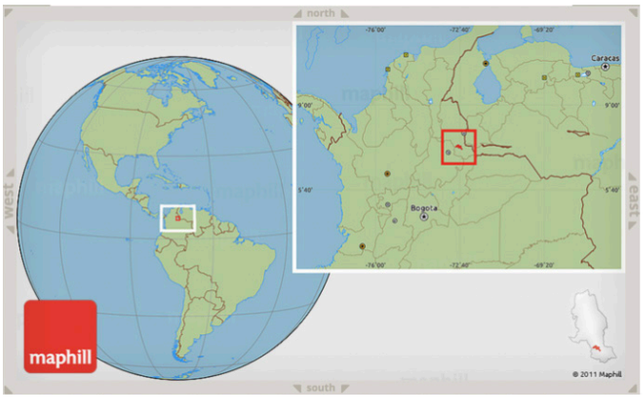

Pamplona on a map (Maphill, 2011)

(Clockwise from top left): ***1*** *Carlos, one of Douglas' oldest Venezuelan volunteers, preparing to register and allocate the men into their sheds. For safety, a barrier is put in place between the shelter door and the road where many caminantes are expected to arrive.* ***2*** *The caminantes often carry heavy bags that are not made for carrying. In the evenings all bags are stacked on top of each other to maximise the floor space. On full nights, Douglas provides a place to sleep for up to 250 people a night in his shelter. Snapshot of a night-scene in one of the five men's sleeping sheds.* ***3*** *At circa 2600m elevation ASL, temperatures frequently drop to 0˚C at night, a temperature drop many caminantes did not anticipate before starting their walk.* ***4*** *While volunteers set up mats and sleeping places inside, caminantes wait along in front of the shelter. An extension cord allows the charging of phones.*

An analysis of vegetation change recorded in three palaeoecological records from Amazonian Peru

Sophie Conyngham Greene (Fourth Year, Geography)

***Abstract* – The recognised significance of Amazonian peatlands as a major carbon store creates a need to understand their past climate sensitivities to predict how carbon stocks will be influenced over the coming century. To fully comprehend future peatland development, knowledge of past vegetation succession is required. This study displays a vegetation sequence that is broadly similar with between cores and consistent with existing studies of Quistococha despite depth differences. There is still a pressing need to understand the present and future attributes of these ecosystems and, most importantly, their role in the carbon cycle. More in-depth research and analyses needs to be done to fully understand the complex variables of the peatland ecosystem.**

1. Introduction

Peatlands occur in almost every country on Earth, currently covering over 3% of the global land surface (Cris et al., 2014). Large volumes of carbon are taken from the atmosphere, held in plant tissues and eventually locked into the peat soils which over time become a valuable carbon store (Cris et al., 2014). Expansive areas of peatlands, an estimated 35,600 km^2, have recently been discovered in Western Amazonia with a potential carbon stock of 3.14 Pg C (Kelly et al., 2017). This discovery facilitates the opportunity to understand the sensitivities and development of this valuable landscape.

The widespread hydrological influence on the Amazonian landscape has created rapidly accumulating peatlands that leave behind well preserved palaeoecological records (Roucoux et al., 2013). As the hydrology transforms over time, the conditions and nutrient inputs adjust, enabling dif ferent vegetation assemblages and complex successions to transpire (Kelly et al., 2017). These records offer a chance to predict future change by observing past vegetation dynamics of peatland ecosystems.

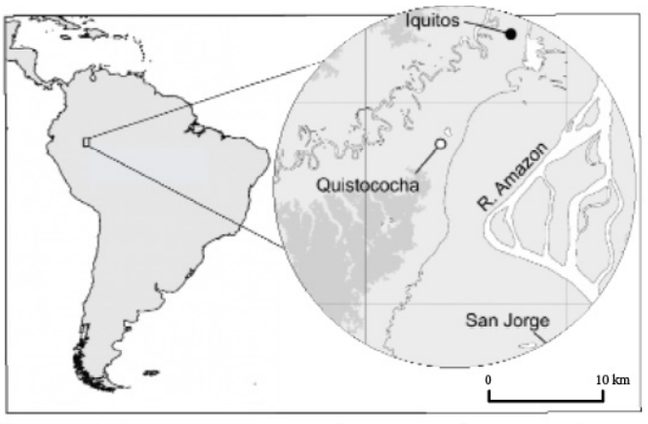

Figure 1. Location of sampling site, Quistococha, which is part of the Pastaza-Maranon Foreland Basin. The main study area's promixity to the Amazon river and two other fluvial geomorphological features can be oberved in this map (Lawson and Kelly, 2017).

The recognised significance of Amazonian peatlands as a major carbon store creates a need to understand their past climate sensitivities to predict how carbon stocks will be influenced over the coming century. To fully comprehend future peatland development, knowledge of past vegetation succession is required (Roucoux et al., 2013, Kelly et al., 2017). These successions could be key in understanding the large potential effect peatlands will have on our climate system (Roucoux et al., 2013). This report aims to understand the progression of peatland vegetation secession by comparing three separate cores from the Quistococha area in Western Amazonia. From this aim, three research questions and related hypotheses have been developed (see Table 1).

2. Methods

2.1 Overview

Three cores were analysed in this report, QT-

Table 1.
The hypotheses for each of the three research questions. Each hypothesis is nubered and indicates which research question it corresponds to.

Research Question #	Research Question	Hypotheses
1	Do the indicator taxa vary between cores?	H1: Indicator taxa are identical between all three cores H0: Indicator taxa not indentical between all three cores
2	Does the vegetation change in a consistent way through time?	H1: The vegetation changes in a consistent way through time H0: The vegetation does not change in a consistent way through time
3	Is there a consistent pattern of change between the three cores?	H1: Ecosystems change on a consistant interval basis H0: Ecosystems do not change on a consistant interval basis

2011-2, QT-2012-9, and QT-2012-18. They come from a Peruvian palm swamp, Quistococha, which is located on the Amazonian floodplain near the city of Iquitos in northern Peru (see Figure 1). The pollen data used in this report comes from University of St Andrews PhD student Tom Kelly and is unpublished; he has permitted for the data to be used in this report. Kelly's pollen data represents a fluctuating record of vegetation assemblage through depth in three sites within the Quistococha area. For exact details of field and lab techniques see (Roucoux et al., 2013).

2.2 Data Manipulation

The initial data set included 42 taxa and 5 separate cores. Cores labelled SJ, QTLake, and QT_1 were removed as they have already been published and analysed. The remaining cores, QT-2011-2, QT-2012-9, and QT-2012-18, were kept; taxa not present within these cores were excluded. Taxa with diverse ecologies were removed as their presence would not aid in the understanding of overall vegetation secession due to their abundance in multiple past landscapes. After these manipulations, 30 taxa and 51 objects remained for analysis. It is important to note this analysis is exceptionally sensitive to taxa removal. Thus, the findings are unique to the selection of taxa exhibited in Table 2.

2.3 Statistical Analysis

In the first stage of analysis, the Bray-Curtis dissimilarity metric, vegdist(x, method="bray"), was used as it can recognize differences in total abundances when relative abundances are identical and solves the "Double-zero" problem (Leftcheck, 2012). A cluster analysis was then run, hclust(x), to identify any groupings within the taxa. Once the three groupings were recognised, the data was divided into clusters, cutree(xc, k=3). The data was then subsetted by core for the indicator species analysis, NMDS, and plotting mechanisms to analyse the individual attributes of each core. An indicator analysis, indval(x), was run to determine which taxa had a strong association with any of the clusters and was used as an alternative to analysing the entire dataset (De Caceres, 2013). Following this, NMDS was first run on each core using metaMDS(x) and then run again as a cascade, starting at k=5, to seek the most accurate results. NMDS was used because it measures community dissimilarities in an ecologically sensical way (Oksanen, 2015). The results were subsequently plotted and appear in Figure 2. Finally, NMDS 1 was plotted against depth and the associated indicator taxa (Figure 3). All analysis was performed in R 3.6.1 (R Development Core Team, 2019; packages vegan and labdsv).

Table 2.
List of taxa found in Cores QT-2011-2, QT-2012-9, and QT-2012-18 at Quistococha and inlcuded in analysis.

Family	Genus	Genus-species
Arecaceae		
Arecaceae	Mauritia	
Asteraceae		
Aquifoliaceae	Ilex	
Bignoniaceae		
Begoniaceae	Begonia	
Bombaceae		
Cecropiaceae		
Clusiaceae	Symphonia	Symphonia globulifera
Cyperaceae		
Elaeocarpaceae	Sloanea	
Euphorbiaceae		
Euphorbiaceae	Acalypha	
Euphorbiaceae	Alchornea	
Fabaceae	Caesalpinoideae	Macrolobium
Fabaceae	Mimosoideae	
Fabaceae	Papilionoideae	
Malvaceae	Pachira	
Melastomataceae/Combretaceae		
Moraceae		
Moraceae	Brosimum	
Moraceae	Ficus	
Moraceae	Maquira	
Myrtaceae		
Onagraceae	Ludwigia	
Other		
Polygonaceae	Symmeria	Symmeria paniculata
Poaceae		
Sapotaceae		
Tiliaceae		

3. Results

3.1 Indicator Taxa

Indicator species analysis (Table 3) found 18 pollen taxa strongly associated with particular clusters within the cores. Taxa that were significantly associated with one zone (<p=0.07) are labelled on an NMDS plot for each core. The indicator taxa vary between cores; with eight indicator taxa being unique to a single core and four taxa found in all three. Taxa with lower indicator scores (> p=0.07), did not have a strong association with any cluster and thus were not labelled. The sum of the total indicator values for QT2, QT9 and QT18 is 8.45, 7.92 and 7.71 respectively. These numbers indicate that there is a strong clustering within the dataset as all of the values add up to over half the maximum value for each cluster (11, 11 and 10 correspondingly).

3.1 NMDS Analysis

NMDS uses rank information and plots these ranks non-linearly onto an ordination space (Oksanen, 2015). It can handle non-linear species responses and successfully finds the underlying gradients to construct precise dissimilarity relationships which is why it was the chosen analytic method for this report (Oksanen, 2015). A favoured dissimilarity has a good rank order relative to distance along these environmental gradients which can be observed in Figure 2 (Oksanen, 2015).

3.1.1 Core QT-2011-2 NMDS Analysis

The plot depicts a large gradient (NMDS axis 1) which follows the dataset's stratigraphy. The first cluster in the top right of the plot illustrates sites that are abundant in Cyperaceae and Cecropiaceae,

Cluster #	Family	Genus	Genus-species	Present in Core Code	highest p-value
1	Arecaceae	Mauritia			0.004
1	Arecaceae			QT2,QT9,QT18	0.036
1	Bignoniaceae			QT9, QT18	0.007
1	Euphorbiaceae	Alchornea		QT2	0.018
1	Moraceae	Ficus		QT9, QT18	0.038
2	Asteraceae			QT9, QT18	0.021
2	Aquifoliaceae	Ilex		QT9	0.069
2	Fabaceae	Papilionoideae		QT2	0.066
2	Melastomataceae/Combretaceae			QT18	0.006
2	Moraceae			QT2	0.044
2	Myrtaceae			QT9	0.061
2	Poaceae			QT2,QT9,QT18	0.042
3	Bombacee			QT2, QT9	0.065
3	Cecropiaceae			QT2	0.062
3	Cyperaceae			QT2,QT9,QT18	0.008
3	Fabaceae	Mimosoideae		QT2, QT9, QT18	0.028
3	Other			QT2	0.034
3	Polygonaceae	Symmeria	Symmeria paniculata	QT9,QT18	0.022
				QT2,QT18	

Table 3. The 18 indicator taxa assoicated with all three cores. Each taxa's full known name is noted along with the cluster its most strongly assoicated with it and which cores it appears in. For simplicity reasons, only the highest p-value attached to the taxa is noted to show the weakest association which is under 0.07 and thus it can be seen that all p values for that taxa are significant for each core.

Polygonaceae Symmeria paniculata, Bombacace and Fabacace Mimosoideae. The second cluster, located the lower middle, overlaps with the first cluster (see Figure 2). This grouping depicts abundances of Poaceae, Melastomataceae/Combretaceae, Aquifoliaceae Ilex, and Myrtaceae. Finally, Cluster 3, located on the left of the plot, is characterised by Arecaceae Mauritia and Bignoniaceae.

3.1.2 Core QT-2012-9 NMDS Analysis:

The gradient along NMDS 1 is shorter than QT-2011-2 but the sequence is very similar to the previous core in terms of shape and cluster location. The top right of the plot begins with high concentrations of Cyperaceae and Ceropiaceae and Other. The sites located in the middle of the plot have strong associations with Poaceae, Myrtaceae, Moraceae, and Asteraceae. Towards the end of the sequence, on the left of the graph, the sites become rich in Arecaceae Mauritia, Euphorbiaceae Alchornea, Arecaceae, and Moracace Ficus.

3.1.3 Core QT-2012-18 NMDS Analysis

Core QT-2012- is again very similar in shape and cluster location to the previous cores. The U-shaped sequence starts with sites rich in Polyonaceae Symmeria paniculata, Cecropiaceae, Cyperaceae and Other. It then transitions into sites abundant in Myrtaceae and Fabaceae Papilionoideae. The sequence ends exactly as QT-2012-9 did; starting in the middle and heading upwards with sites rich in Arecaceae Mauritia, Euphorbiaceae Alchornea, Arecaceae, and Moracace Ficus.

3.2 Depth vs NMDS 1

Despite variations in maximum depth and depth ranges within clusters (see Table 4); all three cores follow the same broad pattern. At the bottom right of each sequence, sites are characterised by Cyperaceae and Cecropiaceae along with varied indicator taxa. Towards the middle of the sequence, Myrtaceae is present, and at the top of the sequence, all sites have an abundance of Arecaceae Mauritia. All cores have a strong gradient along NMDS 1; with QT-2011-2 having the strongest from -1.0 to 0.9, QT-2012-18 following with a gradient from -1.0 to 0.8, and QT-2012-9 from -0.8 to 0.7. QT-2011-2 and QT-2012-18 are quite similar in terms of sequence, both having four sites in Cluster 1 and two in Cluster 2. QT-2011-18 is also similar to QT-2012-9 in terms of indicator taxa; sharing eight of its ten indicator taxa.

4. Discussion

4.1 Patterns of Vegetation Change

4.1.1 Cluster 1 Vegetation Sucession

The high abundance of Cecropiaceae observed in all three cores is expected. As a pioneer taxa, it typically colonizes flood plains shorty after a disturbance (Kelly et al., 2017). Cecropiaceae thrives in large amounts of light so its appearance potentially indicates the presence of forest gaps or newly exposed land surfaces (Roucoux et al., 2013). The open landscape is corroborated by the occurrence of Cyperaceae, a herbaceous taxa that similarly needs large amounts of light (Marchant et al., 2002).

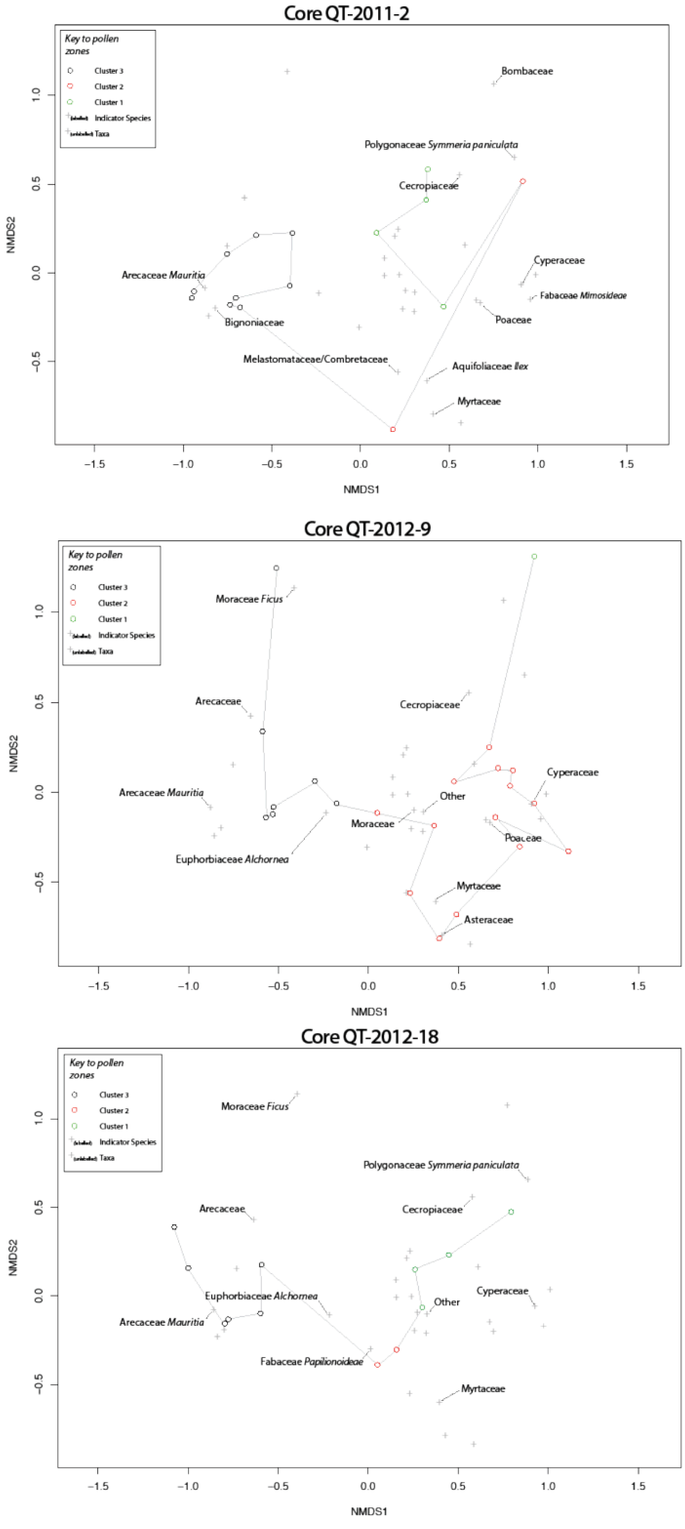

Figure 2. Ordination diagrams for each core displaying a continuous change in vegetation type throughout the sequence. The three colours signify the three clusters found using cluster analysis. Black is the youngest grouping, followed by red, then green being at the bottom of the core. The sequence follows a board U-shape highlighted by the grey soild line starting on the right and ending in the top left.

Supporting indicator taxa, taxa that are indicators for only certain cores, justify this possible landscape further. Polygonaceae Symmeria paniculate, Bombacaceae, and Fabaceae Mimosoideae are typically found in floodplains and all signify a wetland habitat (Roucoux et al., 2013). Cluster 1's vegetation assemblage suggests the formation of a primary open wetland community shorty after a disturbance of potential fluvial nature.

It was initially expected that the cores would have identical indicator taxa as they are from the same area. However, it is noted that the indicator taxa vary, with each core having a different makeup of indicators. The reasoning for this could be due to a combination of high or low pollen productivity and the relative efficiency of pollen dispersal among each taxa (Bonny, 1978). This could signal an under- and over-representation of certain pollen taxa leading to a variety of indicator taxa between cores despite similar ecosystems. Thus, the null hypothesis for Research Question #1 is accepted.

4.1.2 Cluster 2 Vegetation Sucession

Cluster 2's vegetation succession undergoes multiple assemblage transformations. The first taxa characterised by Cluster 2 along NMDS 1 starting from the right is Poaceae for QT-2012-9 and QT-2011-2 (See Figure 3). This is unusual because the existing literature commonly mentions Poaceae and Cyperaceae in abundance simultaneously, however, they are separated by cluster in these findings (Roucoux et al., 2013). Nevertheless, an indicator taxa's abundance is not confined to just one cluster. The indicator value represents the cluster a taxa has the strongest association with, it does not show taxa richness throughout the sequence (De Caceres, 2013). Therefore, it is possible Poaceae peaked in Cluster 2 but still had relatively high abundance in Cluster 1 when Cyperaceae was dominant. This relationship speaks to the repetitive nature of vegetation and the complexities of succession.

Poaceae and Cyperaceae's close positioning on the NMDS plots (see Figure 2) also suggests there could be a gradual transition in vegetation assemblages to either a marginal fen or floating mat vegetation assemblage (Kelly et al., 2018). This idea of a gradual transition is corroborated by the overlap in clusters on the NMDS vs Depth plots (See Figure 3). The presence of Asteraceae substantiates the new vegetation assemblage and indicates the continued riparian succession.

The ecosystem then appears to transition again, with the presence of Myrtaceae, signifying a wetland forest habitat (Kelly et al., 2018). The supporting indicator taxa that follow include Melastomataceae/Combretaceae, Aquifoliaceae Ilex, and Moraceae. These families all signal to wet woodlands and seasonally flooded forests (Marchant et al., 2002). Finally, both the positioning of Euphorbiaceae Alchorena, an indicator taxa for Cluster 3, along

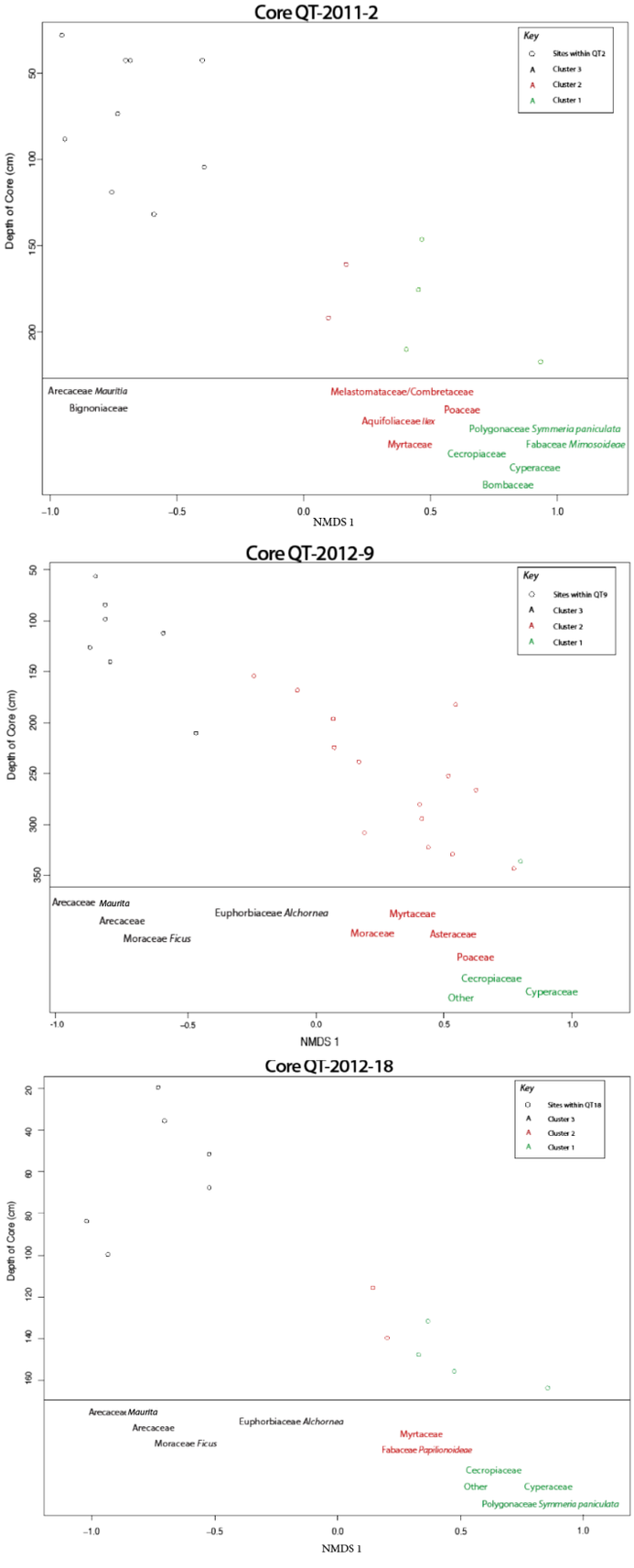

Figure 3. The relationship between NMDS 1 of the sites within each core vs. their associated depth in the core. The indicator values for each core were ran against NDMS1, coloured by cluster and placed under the site samples for reference. Each core is different in depth which can be seen in Table 4. Despite the depth differences, all cores follow the same general trend in respect to taxa progression.

NMDS 1 (Figures 2 and 3) and the use of this taxa as evidence for a wet woodland ecosystem suggests another gradual transition phase from the cluster to cluster vegetation assemblages (Roucoux et al., 2013).

4.1.3 Cluster 3 Vegetation Sucession

The first taxa along NMDS is previously mentioned Euphorbiaceae Alchorena, this taxa is unique because the literature has used it to justify both a wet woodland and a swamp landscape (Roucoux et al., 2013, Kalliola et al., 1991). Roucoux uses the taxa to signify, along with Arecaceae Mauritia, water-logged conditions which indicate a shift in flood regime from the previous clusters. Other species that peak in abundance in this cluster are Bignoniaceae and Arecaceae, both taxa found in swamp forests (Marchant et al., 2002). The indicator taxa suggest a Mauritia palm swamp as the main ecosystem occurring in this cluster.

4.2 Overall Sucession Pattern

The pollen records for all three cores depict the same basic pattern for vegetation change. The sequence starts with a Cecropiaceae dominated landscape, through to a Poaceae and Cyperaceae floating mat or marginal fen vegetation assemblage, followed by a wet woodland habitat with Myrtaceae and finally to a landscape dominated by Mauritia palm swamp. The cores generally follow this pattern; however, they differ in supporting taxa present within ecological communities and the depths in which these communities occur. While the succession is mostly consistent in Cluster 1 and 3 between themselves and the literature; deviation occurs with the taxa in Cluster 2. This suggests that vegetation succession is not a straightforward process of linear progression but includes abrupt changes and reversals of ecosystems throughout time to reach the final phase of sucession (see Figure 4) (Kelly et al., 2017). Thus, the null hypothesis is accepted for Research Question #2. The use of time series analysis on this dataset, alongside NMDS, would be beneficial to provide a clearer picture of these changes. A time series plot would demonstrate the numerous peaks and absences of taxa throughout the core and allow for more accurate assemblages to be overserved since species would not be constrained to one point in time.

4.2 Succession through Depth

While there is a generally consistent pattern of change throughout the cores, all sequences occur at vastly different depths and clusters themselves have wide-ranging depths (Table 4). This possibly indicates the cores differed in rates of succession. However, the existing literature discusses the location of these sites as one unit, “the Quistococha area” when referring

to succession (Roucoux et al., 2013, Kelly et al., 2018, Kelly et al., 2017). Roucoux directly refers to the Quistococha area as one that "began to develop around 1000cal yr BP" suggesting the whole area's succession began simultaneously. This discrepancy

Cluster #	QT-2011-2	QT-2012-9	QT-2012-18
Cluster 3	0cm-150cm	0cm-240cm	0cm-115cm
Cluster 2	150-225cm	210cm-325cm	115cm-137cm
Cluster 1	225cm-224cm	325cm-344cm	137cm-160cm

Table 4. The range of depths for each cluster within the corresponding core. Note that overalp occurs in Cluster 1 and 2 for Core QT-2012-9 and 2 and 3 for Core QT-2012-19

suggests that depth is not an ideal proxy for age as it is too variable and unclear. Thus, the null hypothesis is accepted for Research Question #3. A more successful method would be radiocarbon dating as this would give approximate ages for the pollen groupings and allow for a more precise understanding of succession.

4.3 Drivers of Vegetation Change

In Peruvian Amazonia, geological activity is a fundamental driver in the formation of the peatland landscape (Ervanne et al., 1992). The tectonic activity influences the geomorphology which in turn affects the fluvial systems by creating rivers with high sediment loads and changing courses (Kalliola et al., 1991). Rivers in Peruvian Amazonia shift their positions quite frequently and although this process has been occurring over millions of years, the vegetation has been unable to adapt to the abrupt changes leading to instability in vegetation assemblages (Salo et al., 1986). The variation in vegetation assembles conveyed by the pollen record can be explained by this overall trend of fluctuating fluvial influences (Roucoux et al., 2013).

5. Conclusion

The results show a vegetation sequence that is broadly similar with between cores and consistent with existing studies of Quistococha despite depth differences. The addition of a time series analysis and radiocarbon dating to this report would clear up discrepancies and allow for a more accurate and clear analysis of the vegetation succession. With these additions, there would be more information available on the fluvial drivers of peatland development through time and potentially allow for predicted future changes. There is still a pressing need to understand the present and future attributes of these ecosystems and, most importantly, their role in the carbon cycle. More in-depth research and analysis need to be done in this area to fully understand the complex variables of the peatland ecosystem.

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Harmful Algal Blooms: A Review of Causes and Consequences for Developing Countries

Lea Fourchault (Second Year, Biology and Sustainable Development)

Abstract – **Phytoplankton and cyanobacteria are key drivers of both biotic and abiotic conditions within ecosystems (Berdalet et al., 2016). Nonetheless, they sometimes form blooms that can adversely impact fauna and flora by disrupting community assemblages, and lowering both biodiversity and biomass. These events are called 'Harmful Algal Blooms' (HABs). Such blooms can also have negative impacts on human communities by being costly in terms of reduced tourism and profits from aquaculture/fishery. Finally, they also impact human health through neurotic, diarrhetic and amnetic poisoning. It is therefore crucial to understand which abiotic conditions are favourable to such blooms, and which interactions are at the core of their impact on ecosystems and societies. This essay delves into these aspects, focussing on the tropics specifically.**

Introduction

Phytoplankton and cyanobacteria are the base of food webs in aquatic ecosystems and play a key role in oxygen production and carbon fixation (Berdalet et al., 2016). Nonetheless, specific abiotic conditions can lead to their proliferation, forming blooms that disrupt ecosystems and impact humans adversely: "Harmful Algal Blooms" (HABs). About three hundred species of diatoms, pelagophytes, dinoflagellates or cyanobacteria can form HABs (Landsberg, 2002), and lead to neurotic, diarrhetic, amnesic and paralytic poisoning, sometimes resulting in human death (Berdalet et al., 2016). While these may occur at all latitudes and in all aquatic environments, this paper will focus on blooms impacting coastal waters of South America, South East Asia and the Arabian Gulf, exploring their causes, as well as their consequences on aquatic lifeforms and human societies. The recent increase in blooms in freshwater ecosystems, such as Lake Baikal at the Mongolian-Russian border and lake Yerevan in Armenia, will be briefly examined.

Framing HABs: abiotic factors

HABs are a natural phenomenon and are correlated with specific abiotic factors, including high nutrient availability, lower salinity and, depending on the species, higher water temperatures (Proenca a and Hallegraeff, 2017). In oceans, such conditions depend on winds and associated upwelling, while coastal wa-

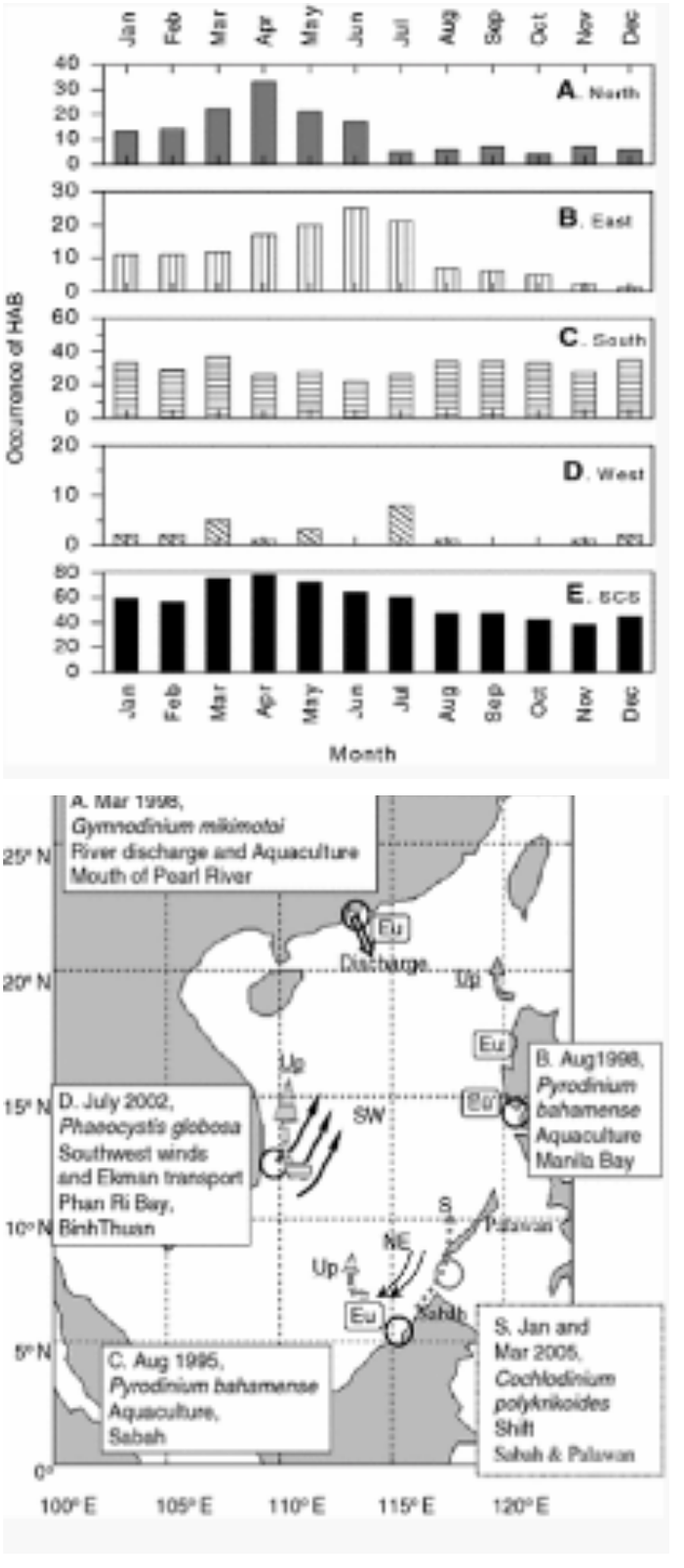

Figure 1: Monthly distribution of HABs in the SCS between 1980-2003, with associated environmental factors (Wang et al., 2008) Key: NE: Northeast wind; SW: Southwest wind; Up: Upwelling. Species names in italics. Bordering countries: China, Malaysia, the Philippines.

ters are also impacted by riverine discharge. Natural climatic variations, such as yearly reversing monsoons in the South China Sea (SCS) or the Gulf of Oman, produce foreseeable changes in winds and currents, and hence allow for a pattern in HABs (Wang et al., 2008; Richlen et al., 2010). The impact of reversing monsoons on abiotic conditions in different areas of the SCS, and the consequential pattern of HAB occurrences in March-June, are shown in Figure 1.

Supra-yearly climatic variations, such as the El Nino-Southern Oscillation (ENSO) that brings warmer temperatures and stronger winds, further modify abiotic conditions (Wang et al., 2008). For instance, the strong ENSO in 2016 resulted in major blooms of Pseudochattonella verruculosa along Chilean coastal waters and fjords. The same year in Brazil saw a record in Dinophysis acuminate, most likely because stronger winds pushed nutrient rich riverine waters (such as La Plata) into the Parana basin (Proenca a and Hallegraeff, 2017). Finally, such oscillations also impact the future dispersal of microalgae since upwelling events transport the species into mid-shelf waters, which become a pelagic seed bank where the cells wait for favourable conditions (Proenca a and Hallegraeff, 2017).

In freshwater systems, especially lakes, winds also play a role through their impact on mixing. Indeed, low wind speed and resulting weak water mixings, combined with an important phosphorus and nitrogen availability are key elements in the formation of freshwater HABs. In 2016, Lake Baikal saw an important HAB (of the Dolichospermum genus) under such abiotic conditions (Namsaraev et al., 2018). Similarly, increased water temperatures and nutrient loads, combined with higher pH values and lower turbulence in the Lake Sevan – Hrazdan River – Lake Yerevan ecosystem, have resulted in the apparition of cyanobacterial blooms and the diffusion of cyanotoxins in the water in the last few years (Minasyan et al., 2018). So far, abiotic conditions such as water temperature and nutrient availability are key factors in the occurrence of HABs. Furthermore, lower salinity and upwelling events encourage the development and dispersion of HABs in coastal and oceanic waters, while higher pH, lower turbulence and occasionally a change in the food web may encourage the proliferation of HABs in freshwater systems.

Anthropic contributors to HABs

Since the 1960s, exponential population growth has led to an increase in wastewaters from urban areas, industries and farms; in developing countries, they undergo less treatment before reaching the catchment area of a river, lake, or the sea itself (Yang et al., 2018). This results in a high and regular input of in/organic material in aquatic systems (eutrophication) encouraging frequent HABs.

Furthermore, international shipping has led to the dispersal of species involved in HABs through uptake and release of ballast water. In the port of Bilbao, for instance, 30 strains of harmful phytoplankton species have been reported. With over 40 million tons of ballast water loaded every 10 years from that port alone, the worldwide export of harmful species is very likely (Butron et al., 2011). Furthermore, Liu and Tsai (2011) emphasize that 70% of vessels are registered in countries that faced HABs in recent years.

Finally, industrialization has led to an increase in greenhouse gas emissions causing global climate change, notably through the tripling of atmospheric carbon dioxide concentrations (Berdalet et al., 2016). This increases the temperature in the upper layers of oceans and lakes, thereby in turn affecting stratification and mixing. In oceans, this may furthermore lead to acidification. It has been projected, for instance, that Alexandrium blooms might last up 30 days more each year by 2040 because of higher surface temperatures, while the toxicity of Pseudo-nitzschia fraudulenta is projected to increase in relation to ocean acidification (Berdalet et al., 2016). While more research needs to be done to evaluate the combined effect of these contributors, it appears that the frequency and geographic extent of HABs has already significantly increased in the last decades, as exemplified in Figure 2 below.

HABs' impacts on ecosystems

HABs can adversely impact ecosystems, either by reducing the species richness and total biomass within an ecosystem, or by affecting the habitat on which the ecosystem is based on through hypoxia,

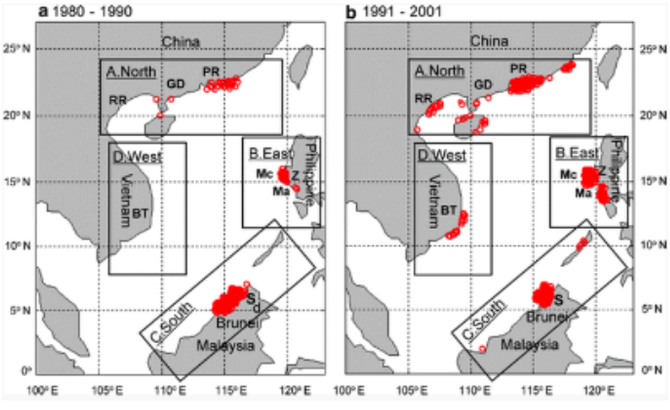

Figure 2: Increasing frequency of HABs in the South China Sea (Wang et al., 2008) Each red circle represents one HAB occurrence, a) from 1980-1990, b) from 1991-2001.

excess ammonia or reduced light penetration.

According to the US National Oceanic and Atmospheric Administration (NOAA), more than half of all Unusual Mortality Events in wild aquatic macrofauna (fish, amphibians, reptiles etc.) are due to microalgal biotoxins (Berdalet et al., 2016). Landsberg (2002) identifies three ways in which HABs are harmful to living organisms: through ingested toxins, diffused toxins and direct cell surface contact while the bloom occurs; through bubble-mediated transport of toxins (aerosolized) as the bloom decays; and, through bioaccumulation, which may persist after the bloom – as illustrated in Figure 3 below.

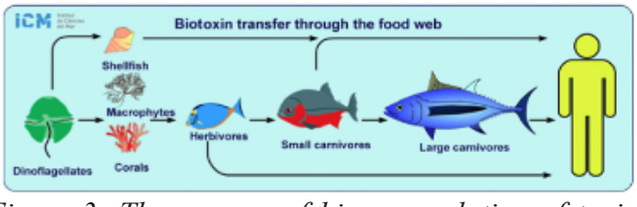

Figure 3: The process of bioaccumulation of toxins during HABs (Berdalet et al., 2016)

Gyrodinium, Karlodinium and Amphidinium spp. are known to produce fish-killing biotoxins, which damage gills through direct cell contact (clogging) and exudation (Bauman et al., 2010; Berdalet et al., 2016); furthermore, brevetoxins from Karenia brevis are known to poison birds and mammals when aerosolized as the bloom decays (bubble-mediated transport) (Landsberg, 2002). Other invertebrates are resistant to microalgal toxins, and hence accumulate the toxins in their lifetime – when preyed upon they transmit the toxins to their predators, which then accumulate in their lifetime. This eventually reaches top predators, such as humans, which have not developed toxin resistance (Landsberg, 2002; Berdalet et al., 2016). In 2008, for instance, a large bloom of Cochlodinium polykrikoides in the Gulf of Oman led

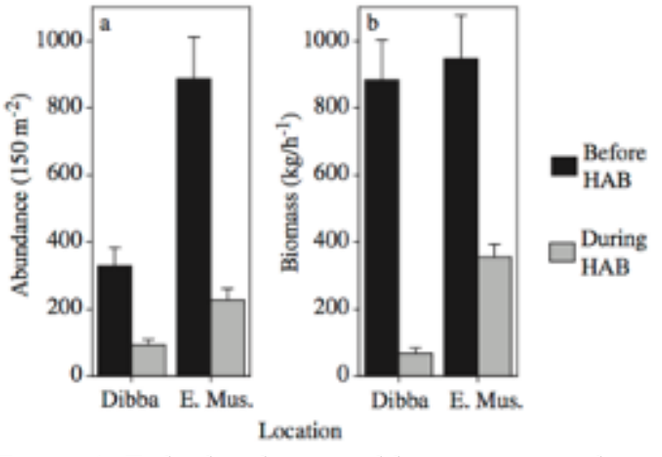

Figure 4: Fish abundance and biomass at two locations in the Gulf of Oman, before and during the HAB event of 2008 (Bauman et al., 2010)

to a drop of up to 60% in fish abundance and 90% in fish biomass, as shown in Figure. 4 (Bauman et al., 2010). C. polykrikoides produces extracellular mucoid polysaccharide substances involved in clogging gills, and other ichthyotoxic substances involved in the loss of biomass and biodiversity observed in Figure. 4 (Richlen et al., 2010).

Nonetheless, as Zamor et al. (2014) point out, many species assemblages recover from HAB events on a relatively short-term scale as similar neighbouring species recolonize the impacted zone after the bloom.

On the other hand, HABs may harm ecosystems on a longer time scale by damaging the habitat they are based on, thereby inhibiting successful recolonization (Richlen et al., 2010); in the Gulf of Oman, the previously abundant coral species Pocillopora damicornis and Acropora arabensis were fully eliminated at one sampling location explaining three-quarters of the benthic community change after the 2008 HAB (Bauman et al., 2010). The current expansion of Cochlodinium spp., involved in both events, to Malaysia, the Philippines and Iran, is a further cause for concern as the mucus produced directly adheres to the corals killing them efficiently by smothering (Richlen et al., 2010).

Other mechanisms disrupting habitats are linked with changing abiotic factors due to the bloom; Photosynthetically Active Radiations no longer penetrate during a bloom leading to the death of autotrophic organism at the base of the food web. Consequently, the high densities of decomposing phytoplankton and dead organisms during a bloom leads to oxygen depletion (Bauman et al., 2010). Being unpalatable, HABs also negatively impact grazer communities. This leads to lower grazer-mediated nutrient cycling, and hence a lesser nutrient availability. This favours HAB species: needing lower nutrient and light levels to thrive and producing more toxins in nutrient deprived areas, they outcompete other species (Sunda et al., 2006). Finally, positive feedback loops further disrupt habitats (Sunda et al., 2006).

In this perspective, HABs cause both extreme losses in terms of biodiversity and biomass at all trophic levels on a short-time scale, and severe ecosystem disruptions on a longer time scale through the destruction of habitats.

Impacts of HABs on developing countries

Evaluating the impact of HABs on developing countries is in itself a challenge as key data sets are missing, as shown in Figure. 5. Nonetheless, human illness and economic damage are two major challeng-

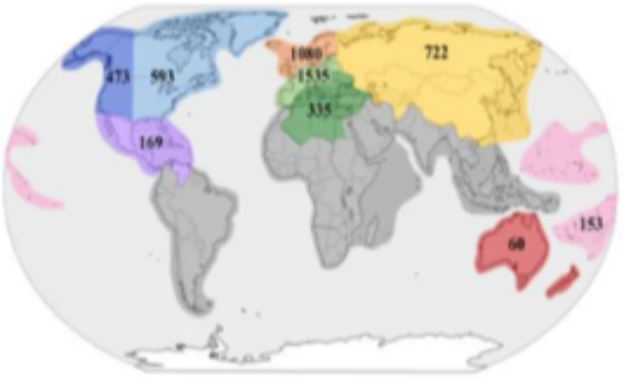

Figure 5: Total number of HAEDAT records per region (Proenca a and Hallegraeff, 2017) Grey zones point to key datasets missing in part of South America, part of Africa and part of South East Asia. HAEDAT: Harmful Algal Event DATaset.

es (Proenca a and Hallegraeff, 2017).

Coastal human populations are impacted by HABs in the same ways as other aquatic organisms, but because many toxins have no odour or taste, poisoning from ingestion is the gravest threat. Resulting symptoms from shellfish poisoning can be classified as amnesic (ASP), diarrhetic (DSP), neurotoxic (NSP) and paralytic (PSP). Ciguatera fish poisoning (CFP) is particularly common in tropical regions, with up to 500 cases per 10,000 habitants in French Polynesia (Berdalet et al., 2016). This is especially challenging for developing countries because their coastal populations rely on seafood as a protein source. In the SCS region, for instance, about half of the coastal population's protein intake is based on seafood (Wang et al., 2008). HABs have thus caused changing diet patterns, especially with the reliance on processed food as an alternative to unsafe wild catch that is linked to the spread of obesity in these countries (Berdalet et al., 2016). Finally, Berdalet et al. (2016) stress the lack of effective procedures to prevent and monitor HABs in these regions.

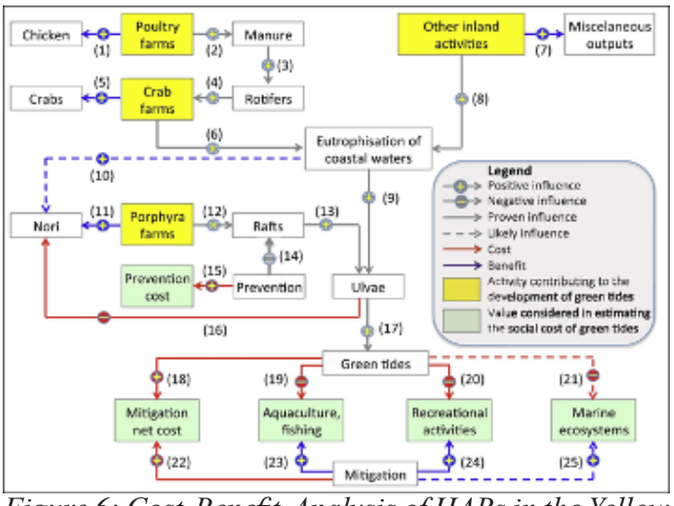

Figure 6: Cost-Benefit-Analysis of HABs in the Yellow Sea (Yang et al., 2018)

Not only do HABs affect human health adversely, they also cause economic damage in three main branches, namely fisheries, tourism, and desalination plants. In the Chinese provinces of Jiangsu and Shandong, HABs impact nori farming, marine aquaculture, and touristic activities (Yang et al., 2018). Figure. 6 summarizes the cost-benefit analysis of green tides in the Yellow Sea, showing the economic impact of HABs on different economically valued activities. Overall, the management costs amount to 136 Million CNY yearly (Yang et al., 2018).

In the Arabian gulf countries, and especially in the region of Abu Dhabi, HABs negatively affect tourism. Indeed, as Blignaut et al. (2016) have shown, Abu Dhabi's beaches' visual amenity has been estimated to range from 8 to 13 Million USD per hectare. When affected by HABs, the odour and visual aspect of the beaches deter tourists from visiting the country, hence creating a short-term drop in the local economy and a negative reputation whose effects last longer than the bloom itself (Blignaut et al., 2016).

Finally, algal biomass may clog pipes causing safety issues in the water quality. In the specific case of desalination plants, microalgae can clog the reverse osmosis membranes leading to unsafe desalinated water production. Between 2008-2009, at least five such plants were closed in the United Arabian Emirates due to an intense bloom of C. polykrikoides (Berdalet et al., 2016).

In this perspective, HABs have negative impacts on economy and health, which challenges developing countries as they sometimes lack effective detection and monitoring systems. Furthermore, HABs harm ecosystems through loss of biomass and biodiversity, and more importantly by disrupting habitats that serve as nurseries and refugia for many rare species. Working hand-in-hand with impacted populations, and using traditional indigenous knowledge might help in the on-site tackling of HABs to avoid most of these impacts. More globally, the impact of each contributing factor needs to be quantified to convince decision-makers to bring about regulations, and more importantly, their efficient implementation.

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Exploring the Possibility of Reintroducing Wolves to the Scottish Highlands as a means of Ecological Conservation

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Abstract – **Deer have helped to shape and maintain the treeless landscape of the Scottish Highlands due to their intensive selective foraging that alters nutrient cycling and ecosystem productivity. Reintroducing wolves may be an opportunity to control deer density, and hence provide a much-needed ecosystem-wide conservation strategy to help overcome the scale mismatches hindering more traditional techniques and to aid afforestation. However, the reproductive rate of deer may surpass the control of the predator and the wider public express concerns for livestock well being. More research, on a scale relevant to the Highlands, must be conducted to assess the extent to which reintroduction can influence deer density, perhaps through the analysis of a synergistic relationship with a second predator species.**

Introduction

Logging, deforestation, extensive grazing and management in recent centuries has resulted in the predominantly treeless landscape of the Highlands today (Huntley et al., 1997). This is in part maintained by deer who hold the ability to be 'ecological landscapers' changing nutrient pathways and the structure of vegetation. These effects are further emphasised as they are regulated by food availability rather than predation (Sinclair, 2003). The deer density in many temperate zones is approximately 10km^2 (Fuller & Gill, 2001; Russell et al., 2001), in part due to the reintroduction of deer to locations lacking in predators. As of yet, scale mismatches have meant the management of deer and vegetation have remained separate, and the necessity to address the ecosystem as a whole is important for conservation. This essay looks at the possibility of reintroducing wolves into Scotland as an ecosystem-wide conservation strategy and the reasons for and against it (Nilsen et al., 2007).

Impacts Associated with Deer Density

Deer browsing directly affects plant reproduction due to their grazing-focus on flowers (Augustine & Frelich, 1998), thereby affecting plants for many seasons post-defoliation (Whigham, 1990). Deer overabundance means a decline in plant diversity; trees are most at risk from browsing by deer as seeds, seedlings and saplings (Potvin et al., 2003) or, in the northern hemisphere, when they are between 30 and 60cm tall (Gill, 1992). Evergreen trees, like those species in Scotland, are particularly intolerant to browsing due to high investment in their leaves, poor retranslocation of their nutrients, and being one of few food sources during the winter (Ammer, 1996). Plant species' competitive relationships are affected by selective foraging by deer. This occurs directly by reducing vegetation cover and diversity (thereby altering trophic levels and species interactions) and indirectly by modifying the pathway of succession, therefore creating an alternative stable state that may well prevent the establishment of the originally dominant species (Stromayer & Warren, 1997). This has led to deer being described as 'biological switches' (Laycock, 1991; Hobbs, 1996; Schmitz & Sinclair, 1997). In general, they act to reduce an ecosystem's productivity and decelerate nutrient cycling. Similarly, the direct competition with other herbivores creates yet more cascading effects on animals (van Wieren, 1998).

Lower density stands (with a low height brought about by deer browsing) necessitate a longer stand rotation, while terminal buds being browsed leads to the formation of multiple leader stems from the axillary buds (as seen in Sitka spruce in Glenbranter Forest) (Scott et al., 2009). This leads to an ultimate decrease in their commercial value (Côté et al., 2004). Adding further economic strain to forestry, bark stripping by deer increases the trees' susceptibility to fungal infection, while also reducing their growth and quality (Gill, 1992). In order for the timber industry to be sustained, the residual deer population should be maintained at a low to moderate density (deCalesta and Stout, 1997).

Deer have also been known to aid the transmission and outbreaks of disease, including lyme disease (Wilson et al., 1988, 1990; Telford III, 2002) and Bovine tuberculosis (Schmitt et al., 1997) threatening livestock and people. Additionally, when in abundance, deer are more likely to be involved in traffic collisions, and in 1996 were estimated to have caused $1 billion of material damage (Groot Bruinderink & Hazebroek, 1996).

Benefits of Wolf Reintroduction

Wolves were wiped out across much of the Scottish Highlands by 1769, and if reintroduced, their main prey would be red deer. Wolves could therefore alleviate the financial burden of culling deer in order to meet the Deer Commission for Scotland's target

deer densities (Nilsen et al., 2007), whilst also reducing their ecological impacts. Projects in North America suggest that this can also be achieved through wolves' nonlethal 'behaviourally-mediated' effects on deer, therefore implying that fewer wolves are required than predicted in predator-prey models (Manningalain et al., 2009).

Wolves may act as 'umbrella species' for conservation due to their cascading effect on the entire community; their protection could aid the whole ecosystem. They can therefore be viewed as 'indicator species' helping ecologists monitor the health of the ecosystem (Sinclair, 2003).

The mean home range of wolf packs studied in Croatia (1998-2001) was 150.5km^2 (Kusak et al., 2005). This means the Scottish Highlands would be the only potential location in the UK suitable for wolf reintroduction due to its size and the low human and high ungulate populations (Wilson, 2004). Understanding wolf territories may not be as complex as previously thought and can be established using a relatively simple set of formulas using scent markers (Lewis et al., 1997), thereby aiding the monitoring and maintenance of the population.

Disadvantages of Wolf Reintroduction

The intrinsically high rate of deer reproduction leads to fears that the population might exceed that of predator control and the habitat's carrying capacity (Côté et al., 2004); wolves were moved to Isle Royale in a bid to reduce the moose population, but to no avail (Peterson, 1999). However, this does not mean that wolves cannot play a role in ecological conservation; the formation of fragmented landscapes have led to 'mesopredator release' (including domestic cats) causing a decline in prey species (including birds) (Crookes and Soule, 1999). Reintroducing mammalian carnivores can control such predators.

General public attitude (of rural and urban residents) seems in favour of wolf reintroduction, although some negativity has been voiced by farmers, and more so by the organizations representing them as wolf attacks and the killing of livestock have been recorded in Europe (Wilson, 2004). Further conflict between human and wolf populations may arise due to the variation in home ranges brought about by the balance between the danger of human proximity and human-related food sources (Kusak et al., 2005).

Are predators even needed? Are the ecological issues only arising due to deer abundance or do other local factors and characteristics of the habitat influence the impact on the ecosystem (Reimoser, 2003), such as landscape fragmentation and productivity? If deer abundance isn't the issue, then wolf reintroduction may not be the solution.

Other Means of Mitigating Deer Impacts

Deer hunting can be used as a means of controlling population density. However, in recent years, there has been a decline in hunter recruitment and retention (Enck et al., 2000). The lack of an ecologically oriented hunting ethos makes it a limited form of deer management (Côté et al., 2004).

Sonic deterrents have been developed, but their effectiveness at reducing impacts and their damage to the deer has been called into question due to a lack of controlled and replicated experiments (Bombard and O'Brian, 1990).

Individual plastic tubing and fencing have proved expensive and quite ineffective (Côté et al., 2004) and repellents, while effective in high concentrations, are somewhat limited by external factors (Andelt et al., 1992). Deer relocation has also been attempted but is expensive and associated with high deer mortality rates (Beringer et al., 2002). Fertility control and immunocontraceptive techniques, while acting to limit reproduction (McShea et al., 1997), are expensive, disruptive to normal reproductive behaviour (Nettles, 1997), and are difficult to implement on the scale needed in the Scottish Highlands.

Natural variety suggests there is also the possibility of plants improving their fitness and becoming more tolerant to browsing, whether that be through traits to reduce plant selection or intake rates (Côté et al., 2004). This, however, cannot be relied upon as a form of management due to the timescale.

The Future

To sustain a functional wolf population, an area of at least 600km^2 must be available; such a fenced reserve is potentially feasible in the Scottish Highlands (Sandom et al., 2011).

It has been noted that, in some cases, two or more predator species work better synergistically than alone, thereby becoming the primary factor in limiting prey population size (Kunkel and Pletscher, 1999). It may, therefore, be suggested that other predators should be considered alongside wolves in Scotland to achieve the best results.

Factors unique to the Scottish Highlands that influence ecological dynamics must be explored and research must be conducted pre-reintroduction to establish the bearing of such factors (Côté et al., 2004; Nilsen et al., 2007). Therefore, though many studies have taken place to investigate the impact of deer and their interactions with predators, these cannot be di-

rectly applied to Scotland as management is strongly determined by a stand's individual characteristics (Tester et al., 1997).

The current state of deer impacts in the Scottish Highlands must be established through combined natural, field and laboratory approaches (Côté et al., 2004) followed by a large-scale controlled experiment in the Scottish Highlands. To improve understanding and assess feasibility, wolves must be observed in the landscape of interest, and the nonlethal impacts on deer behaviour and vegetation recovery over the necessary temporal and spatial scales required must be monitored (Manningalain et al., 2009). In this way we may establish a better understanding of the costs of wolf reintroduction in Scotland enabling ecologists to confidently pit these costs against the severity and urgency of those associated with the current state of deer density.

Conclusion

Wolves could be reintroduced to Scotland as a means of controlling its deer population, and hence ecosystem conservation (directly upon tree stands and indirectly upon the communities and processes that rely upon them). However, prior to this, further research has to be conducted, as the effects of management strategies on woodland communities may be long-term and irreversible (Côté et al., 2004).

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A POSTnote on Natural Climate Change

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***Abstract* – Natural climate change is the natural, not human-induced, process in which the Earth's climate changes over time. This POSTnote aims to summarise the causes of natural climate change over glacial-interglacial timescales and on shorter timescales within the Earth's most recent period, the Quaternary. Following on from this, it will give a brief overview of how natural climate change has influenced human civilisations during the past 10,000 years. The POSTnote will conclude by examining the possible future of Earth's climate under both the influence of natural and anthropogenic forces. The final section will include two key geographical questions to consider. These will become useful for the government's role in implementing future policy issues.**

Causes of natural climate change

Orbital Variations

When referring to periodicities of tens to hundreds of thousands of years, variations in the shape of Earth's orbit and how its axis changes direction over time as an explanation for repeated glacials and interglacials is significant. Milutin Milanković thought that at 65° latitude, insolation can vary by up to 25% (Maslin, 2016). His theory comprises three features of Earth's orbit around the Sun as illustrated in Figure 1. These parameters determine the amount and distribution of solar radiation received at the Earth's surface.

1. Eccentricity

The first is orbital eccentricity, which is the change in Earth's orbit due to gravitational forces from an elliptical-bearing shape to a more circular shape. When the orbit bears ellipticity, the difference in solar radiation received at the Earth's surface between summer and winter becomes more pronounced. This has a periodicity of 100kyr.

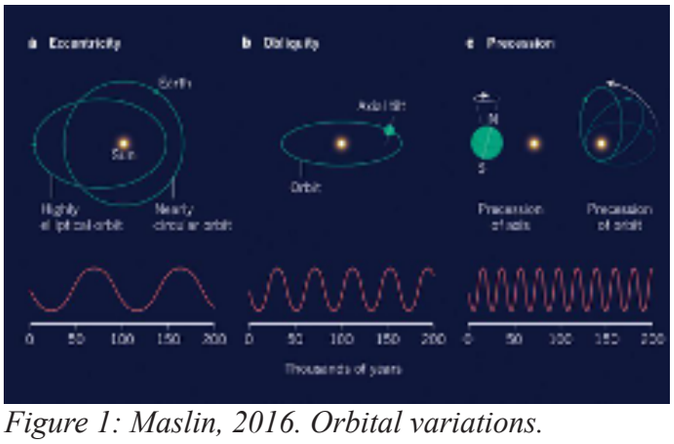

Figure 1: Maslin, 2016. Orbital variations.
A spatial and graphical visualisation of the three parameters that comprise Milanković's theory. The top half indicates the position of the Earth with respect to the Sun. The bottom half indicates the cyclical nature of the three parameters.

2. Obliquity

The second is obliquity, which defines the tilt of the Earth's axis, having a periodicity of 41kyr and a tilt angle variation between 22.5° and 24.5°. The greater the tilt, the more extreme the seasons are, with the higher latitudes experiencing the greatest variance in terms of the amount of solar radiation received.

3. Precession

The final aspect is precession, which can be described like a spinning top, in that the Earth's axis wobbles in a conical-like path. This dictates the link between when the seasons occur and the position of Earth when it is orbiting the Sun. It has a periodicity between 19 and 23kyr (Holden, 2017).

In 1976, Hays et al. published a cutting-edge paper that provided the first bit of evidence that orbital variations paced ice-age cycles. They tested Milanković's theory using climate records, and by examining marine sediments. Orbital variations are clearly a key driver of natural climate change over the glacial-interglacial timescale. However, due to their effect in only causing temperature decreases of up to 4°C, they cannot fully justify the cycles alone as temperatures during glacials can decline by up to 13°C (Marshak, 2011).

Additionally, a specific orbit can be linked to many varying climates. The configuration today reminisces the one during the most extreme part of the last ice age (Maslin, 2016). This is another reason why orbital variations may not be so reliable as an explanation for ice ages.

Changing Albedo and Sea Level

When ice sheets start to form, the albedo – the scientific term for reflectivity- of solar radiation on the Earth's surface increases. This is because whiter surfaces naturally reflect more radiation. A further decline in temperature is caused by higher albedo, hence allowing for the enlargement of ice sheets. The extra global cooling during the Pleistocene epoch that couldn't be fully justified by orbital forcing may have been caused by an albedo effect indirectly. The decline in sea level induced by ice sheet growth allowed for more ice to settle onto continental shelves, thus increasing albedo. Nevertheless, Broecker and Denton

(1990) suggested that albedo and sea-level change, although important factors, would not account for the full-scale cooling seen during the cold periods of the Pleistocene Epoch.

Volcanic Eruptions

Volcanic eruptions can produce short-term cooling periods. As they erupt, they release SO^2 into the stratosphere. These particles react with water vapour and dust to form sulphate aerosols that partially reflect and scatter radiation, resulting in surface cooling. This effect can cause globally lowered temperatures for as much as several years, depending on the scale and explosivity of the eruption. For example, when Mount Pinatubo erupted in 1991, approximately 20 million tonnes of SO^2 were released into the atmosphere, which meant that the average global temperature for the following year decreased between 0.1 and 0.2°C (Holden, 2017).

Volcanic eruptions can also result in a longer-term warming effect worldwide by emitting CO^2 in large enough quantities to add to the natural greenhouse effect. Its effect lasts long-term because the last remaining CO^2 particles have an atmospheric lifetime of hundreds of years. Yet compared to the total emissions produced by humans, the amount is very small. Nevertheless, the NOAA argue that the cooling effect produced by volcanoes is more significant than the warming from volcanic greenhouse gases (NOAA, n.d.)

Yet still, there is a loose relationship in explaining why there has been warming in the 20th century. The low volcanic activity and consequent fewer emissions of CO^2 correlates to this. However, the increased volcanic activity in the latter half of the 20th century would have resulted in a cooling tendency. This isn't the case, as there has been rapid global warming since 1975 (Holden, 2017). Therefore, the conclusion by Karlén et al. (1999) is that anthropogenic sources of CO^2 are more significant factors in causing global climate change than volcanic sources.

Solar Forcing

Bard and Frank (2006) believed that variations in the amount of heat emitted by the Sun would lead to climatic changes. These solar variations are related to the sunspot cycle; the presence of black spots thought to be magnetic storms on the surface of the Sun. In short, the greater the number of sunspots, the less radiation the Sun emits. This occurs every 9 to 11.5 years as illustrated in Figure 2. However, although the current cycle has a short periodicity in contrast to the Milanković cycles, there is debate over whether there may be longer-term cycles (Marshak, 2011). This could mean that, in the future, solar variations may in fact cause more long-term climate change rather than just short-term variation. This is something that governments and officials should be wary of if new literature emerges.

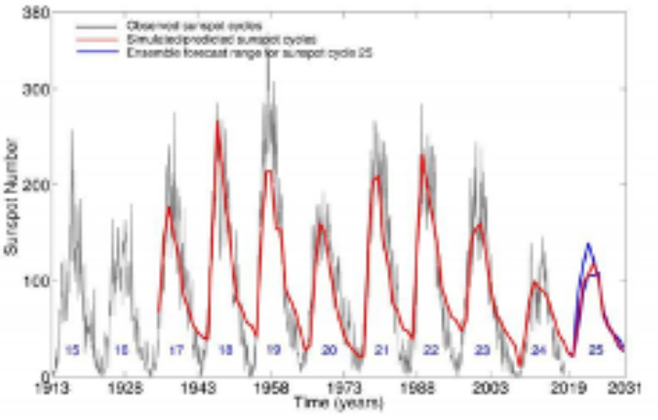

Figure 2: Byrd, 2018. Variations in sunspot cycles.

How natural climate change has affected human civilisations in the past

The Pleistocene Epoch

The farming age only began 10.5kya (around the end of the Pleistocene), yet modern humans have lived for 200kyr. During most of this time, Earth was experiencing glaciation. This meant a drier climate with reduced levels of CO^2, so it was difficult for humans to find a region that was warm and wet enough for effective crop yields. Even when humans had the necessary skills to undertake domestication, only during an interglacial would environmental conditions allow agriculture to become a viable mode of living (Lewis and Maslin, 2018).

The Holocene Maximum and the Middle East

It has been suggested that the rise of civilisation in the Middle East is linked to the increased precipitation 6kya – the time of the Holocene Maximum. This was when global average temperatures were 2°C higher than present. It was the increased evaporation then that led to more rainfall, thus making the Middle East more fertile and habitable (Marshak, 2011).

The Little Ice Ages

Between 1350 and 1900, Earth's climate was considerably colder than today's, with best estimates that much of Northern Europe was 1°C colder (Grove, 1988). Proposals of causes include those described above and a decline in the global human population due to the Black Death, limiting agricultural output. The cultural effects of the Little Ice Age included the reduction in agricultural production as

during the most severe decades people were forced to migrate from upland farms so these became abandoned. It's been suggested that depopulation in the Western Hemisphere during the European conquest caused temporary reforestation because of neglected farmlands.

An incoming ice age or a super-interglacial ahead?

In 1972, scientists believed that the present interglacial would end relatively quickly unless humans intervened (Kukla, 1972). However, today the arguments against this assumption are more apparent. Research from Archer and Ganopolski (2005) showed that even modest amounts of future human-induced cumulative emissions of CO^2 (up to 1500 gigatonnes of carbon) will delay the next ice age by a minimum of 100kyr. Peltier and Vettoretti (2001) suggest that under today's small amplitudes in insolation variations and pre-industrial CO^2 levels a glaciation is almost impossible. This indicates that we are perhaps in a super-interglacial and need not be concerned of a future ice age. It also shows that this 'perfect' correlation between Milanković cycles and interglacial boundaries is not so perfect as we are at a time of almost minimum summer insolation and there is no evidence for an ice age (Ganopolski et al., 2016). Perhaps orbital variations were a more significant factor in determining past climates as opposed to those nowadays, which can be explained more by increasing levels of CO^2.

Can we distinguish natural climate change from anthropogenic climate change?

It has been suggested by chemist Paul Crutzen that we are currently in a new geological epoch known as the Anthropocene. This is viewed as a time in which humans now dominate the climate and environment. Many authors describe levels and rates of CO^2 increase today as 'unprecedented'. For example, between the beginning of the Industrial Revolution and 2016, CO^2levels increased at a rate of 0.6ppm/year compared to the much smaller rate of 0.01ppm/year between the LGM and the start of the Holocene (Lewis and Maslin, 2018). We can infer that anthropogenic climate change has the power to affect Earth systems, such as the carbon cycle, at much faster rate than that of natural climate change. Additionally, as anthropogenic climate change may only directly cause one parameter to change - greenhouse gases - we can also infer that with temperatures today higher than ever before, levels of greenhouse gases are, and will continue to be, the dominant factor in causing climate change, as opposed to orbital variations for example.

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