

# UW SOURCE

THE PGCE SECONDARY AND POST-COMPULSORY  
EDUCATION MAGAZINE

## SUSTAINABILITY EDITION

This edition includes:

Digital farming

Sustainable ceramics

Future trends in population  
and food production

Hunger in Worcester: exploring  
local food security

Food waste



University  
of Worcester  
Institute of Education

Vol. 1, Issue 2, 2023



# SUSTAINABLE DEVELOPMENT GOALS

## The 17 Sustainable Development Goals (SDGs)

1. **No Poverty** – End poverty in all its forms everywhere
2. **Zero Hunger** – End hunger, achieve food security and improved nutrition and promote sustainable agriculture
3. **Good Health and Well-Being** – Ensure healthy lives and promote well-being for all at all ages
4. **Quality Education** – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
5. **Gender Equality** – Achieve gender equality and empower all women and girls
6. **Clean Water and Sanitation** – Ensure availability and sustainable management of water and sanitation for all
7. **Affordable and Clean Energy** – Ensure access to affordable, reliable, sustainable and clean energy for all
8. **Decent Work and Economic Growth** – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
9. **Industry, Innovation and Infrastructure** – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
10. **Reduced Inequalities** – Reduce inequality within and among countries
11. **Sustainable Cities and Communities** – Make cities and human settlements inclusive, safe, resilient and sustainable
12. **Responsible Consumption and Production** – Ensure sustainable consumption and production patterns
13. **Climate Action** – Take urgent action to combat climate change and its impacts
14. **Life below Water** – Conserve and sustainably use the oceans, seas and marine resources for sustainable development
15. **Life on Land** – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
16. **Peace, Justice and Strong Institutions** – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
17. **Partnerships for the Goals** – Strengthen the means of implementation and revitalize the global partnership for sustainable development

Source: <http://www.un.org/sustainabledevelopment/sustainable-development-goals>



## Box 1.1. Key competencies for sustainability

**Systems thinking competency:** the abilities to recognize and understand relationships; to analyse complex systems; to think of how systems are embedded within different domains and different scales; and to deal with uncertainty.

**Anticipatory competency:** the abilities to understand and evaluate multiple futures – possible, probable and desirable; to create one's own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.

**Normative competency:** the abilities to understand and reflect on the norms and values that underlie one's actions; and to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions.

**Strategic competency:** the abilities to collectively develop and implement innovative actions that further sustainability at the local level and further afield.

**Collaboration competency:** the abilities to learn from others; to understand and respect the needs, perspectives and actions of others (empathy); to understand, relate to and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory problem solving.

**Critical thinking competency:** the ability to question norms, practices and opinions; to reflect on own one's values, perceptions and actions; and to take a position in the sustainability discourse.

**Self-awareness competency:** the ability to reflect on one's own role in the local community and (global) society; to continually evaluate and further motivate one's actions; and to deal with one's feelings and desires.

**Integrated problem-solving competency:** the overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution options that promote sustainable development, integrating the above- mentioned competences.

Source: <https://unesdoc.unesco.org/ark:/48223/pf0000247444>

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## Opening remarks

Welcome to our second partnership magazine! This edition of our rebranded publication, now “UW Source”, is focused on Sustainability and Food!

This issue connects us to the UN Sustainable Development Goals (SDGs) 2 (Zero Hunger) and 4 (Quality education for all). You can learn more about the SDGs and the key competencies our students need in their education for sustainable development on the inside of the front cover and find out more about the latest UN reports on SDG 2 on the back cover.

The IPCC special report on Climate Change and Land, reminds us that our global food system includes “all the activities and actors in the production, transport, manufacturing, retailing, consumption, and waste of food, and their impacts on nutrition, health and well-being, and the environment “ (IPCC, 2022, p439). Chapter 5 of the report focuses on food security and highlights that that this essential system is highly vulnerable to climate change. From direct impacts on yields and indirect impacts on water availability, biological pests, pollination services and disease, as well as through food safety risks in transportation and storage and the impacts on the health of the agricultural workforce in increasing temperatures. The report recognised, with high levels of confidence, that food security will be increasingly affected by future climate change and recognises this as a threat to both physical and cultural health. This realisation and recent near doubling of the number of UK children in food poverty in a year (Butler, 2023), we felt it essential that we open up the conversation and seek opportunities within our curriculum spaces to explore this sustainability topic.

We are delighted to share this publication with our wonderful partnership schools and beyond. It is the culmination of a collaboration between the University of Worcester Secondary PGCE tutors, trainees and subject mentors. The articles, herein, explore subject reflections on sustainability on the theme of food. The

publication also includes QR codes, linking you to resources on this theme, developed by our trainees, for you to use in your own classroom.

This opening contribution comes direct from one of our PGCE Science trainees, as he grapples with the enormity of the sustainability task at hand:

As a trainee teacher, my post-lesson conversation with my mentor goes something like this: “So, Garry, tell me two things you did well and two things you would like to work on.” This productive exchange is typical of situations in which we want to affect change over time: focus on the

most urgent, and prioritise the goals, so that they are manageable and achievable and not overwhelming. Now, imagine that the approach behind the UN Sustainable Development Goals (SDGs) was applied to teacher training. The conversation may go something like this: “Garry, the situation with your teaching is so dire, we have reached a crisis, therefore, here are 17 goals I would like you to work on and I’ve broken those down into 169 targets!” Has such urgently needed change ever been successfully achieved with an approach like this? Surely, if we are to affect the change we need in the time we have to achieve it, we need a more focused approach.

All of the 17 goals identified by the UN are perfectly worthy. But the ‘design by committee’ bloating is all too evident, whereby prioritisation cannot be achieved, and everyone’s own personal goals become indispensable to the entire project. The problem with this approach is the inevitable inertia it incurs. If everything is equally important, then nothing is important. If everything equally requires urgent action, then there will be no action. This inertia has paralysed governments over decades and will not be solved by simply multiplying the targets.

My teacher training tells me that effective change is achieved via focused, targeted and limited intervention. One could argue that none



of the 17 goals that the UN has articulated could be omitted. But to go down this route will only exacerbate the inertia that the climate activists are increasingly desperately trying to draw our attention to. We must come together and articulate a single global goal to which we can all commit. "That's impossible," I hear you cry, "my family can hardly agree on what's for dinner, let alone agree on what the nations of the world should unite around." It would be naive to assume that a single goal could easily be identified, but I would argue that this is the challenge that faces us as a species. Failure to prioritise will lead to society being overwhelmed by the task and a consequent catastrophic failure to act. We can all agree this is not sustainable.

I propose that a single goal be prioritised, not at the exclusion of all others, as they are all too worthy to be overlooked, but prioritised to see immediate tangible, effective change that will directly impact the climate crisis. For me, food production is that issue. Nutrition is critical to our survival as a species, but our methods of food production, through the use of animals for meat and the adverse impacts of our worldwide use of pesticides, is one of the major factors that contributes to our climate and ecological crisis.

Pesticides (natural or synthetic chemicals that are used to control weeds, disease and pests in plants) are an important tool for maximising crop yields, but their extensive and injudicious use has serious consequences in terms of their persistence in contaminating soil and water, and their bioaccumulation (increasing concentrations in organism tissues through successive food



chain levels). The UN Special Rapporteur on the right to food, Michael Fakhri, has highlighted the global threat of pesticides to the entire ecological system, the impacts on biodiversity loss and destruction of beneficial insect populations (Sharma et al, 2019). The killing of animals as a source of human nutrition, in the context of abundant

alternatives, is something that will appear barbaric to future generations. But not only that, our method of farming the animals we slaughter for food is simultaneously killing us. As George Monbiot, the environmental journalist has argued, "Livestock farming is the most potent means by which we amplify our presence on the planet." (2016) This is primarily due to the land/water use required and deforestation, river pollution and greenhouse gas emissions. This is not a war on the carnivores; rice cultivation is extremely environmentally damaging and should also be abandoned forthwith.

As we move to a new era, humans must live in symbiosis with the planet and its other inhabitants, and not in exploitation of them. The transition to a non-meat-based diet would benefit from every individual contribution. For many years we have been recycling waste, but the impact of these actions at the individual level is minuscule compared to the actions of global corporations, who refused to do likewise and continue to pollute our rivers, oceans, land and air. For the individual, negating the reliance on animals for food would immediately summate to an enormous global impact, in a way that no other individual change could similarly achieve.

Applying the prioritisation that my teacher training has engrained in me, could mean that in 100 years, we still have classrooms to teach in.

By Dr. Garry Honey, PGCE Science trainee.

We sincerely hope that this publication will enable you to begin to explore or deepen your work around the issues surrounding sustainability and food. We hope that the publication will help you open discussions around the impacts of climate change on food security, Britain, and the wider world.

Throughout this Sustainability and Food edition of your UW Source magazine you will find a series of QR codes linking you directly to subject specific classroom resources, developed by our trainees, for teaching about these themes.

Yours in education,

The PGCE Secondary and FES team

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## Food waste

*Sue Parker-Morris is the University of Worcester PGCE secondary subject leader for design and technology (food). She left the catering industry to train as a Food Technology teacher in 1991 before teaching in secondary schools across the UK and New Zealand. Her experience includes middle management roles, leading and developing Food Preparation & Nutrition and teaching both Food and Textiles.*

With 70% of food waste in the UK coming from our homes, it is clear that this is a massive concern for everyone and the environment (love food hate waste, 2023). As food teachers, we have always had a very clear message that has focussed on teaching pupils about the importance of using seasonal and locally sourced food in our diets and cooking. Therefore, this message needs to feature higher in our priorities when planning our curriculum content. With a greater focus on the utilisation of leftover ingredients and using foods which are in season when planning our meals for the week, we could in turn reduce food waste and save money for every household. Even before the COVID-19 pandemic, there was a growing number of people experiencing hunger and food insecurity (United Nations, 2022).

### ***Making informed decisions about the food we eat and how we produce it will prevent damage to our planet***

Whilst the subject of food teaching has been given many titles over the years, from the early beginnings of domestic science, home economics, design and technology and its present title of Food Preparation and Nutrition, I question whether the title of 'Home Economist' is better suited to the subject in today's current climate. Home Economics focussed on food planning and purchasing, budgeting, nutrition, seasonality of food and how to cook a meal from left over foods; essential life skills in today's climate. Does the current curriculum address the importance of the UN Sustainable Development Goals, which amongst its seventeen goals identify the issue of food waste? Goal 2 - zero hunger, sets out to end hunger and achieve food security and improve nutrition (United Nations, 2023). But as stated in the sustainable development goals report (2023), 1 in 10 people

worldwide are suffering from hunger and 1 in 3 people lack regular access to adequate food. What can we do to ensure this statistic is improved?



As food teachers, educating the next generation of students about the importance of reducing the amount of food consumers waste will not only have financial benefits but also environmental benefits too.

Making informed

decisions about the food we eat and how we produce it will prevent damage to our planet. Food systems are the single largest contributor to biodiversity loss, deforestation, drought, freshwater pollution and the collapse of aquatic wildlife (The National Food Strategy 2021). Taking responsibility for every item of edible food that we throw away must really be considered. Overripe banana can be used as an example that featured in so many recipes for Banana bread during the Covid Pandemic lockdown. Overripe banana is still an edible food; using seemingly 'off' food really can make a difference because the whole process from farm to fork draws resources from the planet and produces greenhouse gas emissions. When food waste goes to landfill, it rots and during this process, methane gas is produced, which is the primary contributor to the formation of ground-level ozone, a harmful air pollutant and greenhouse gas (United Nations 2022).

The skin of the banana is not just edible but rich in several key nutrients, including potassium, fibre, polyunsaturated fats and essential amino



acids. Utilising the banana skin is common in southeast Asia, India and South American recipes; used in curry's, stir-fry's and even used as banana peel bacon! Definitely worth an explore as well as using the flesh in the banana loaf!

As well as our household waste, which is something we can all take a moral and environmental responsibility for, there is also the unfathomable issue of waste from UK farms each year; an incredible amount of edible food goes to waste in the UK (WWF, 2023). The report by the WWF, in collaboration with Tesco, has estimated that almost 3 million tonnes of edible food valued at £1.8 billion, which is roughly 6.9 billion meals goes to waste on UK farms each year. More than a quarter of food grown in the UK is never eaten, around 6% of total UK greenhouse gas emissions is produced by this wasted harvest. Around a third of the waste does not even leave the farm, due to the fact it doesn't meet the required specification (The National Food Strategy, 2021). With the rising costs that families are currently facing, it seems baffling that so much food is left to waste. With consumers willing to purchase wonky vegetables and numbers increasing from 14% in 2021 to 16.7% in 2022 (The Grocer, 2022), this seems to be a great way for growers and retailers to reduce food waste and for households to obtain cheaper and tasty vegetables.

**So, what can we do in school?**

The PGCE Design & Technology Food trainees explored the current KS4 curriculum content that refers to the teaching of food provenance. This includes 'the impact of food security on the environment, local and global markets and communities' (Department for Education, 2015) and considered how they could make a difference to inspire the next generation. It was felt that there was a need to start thinking more about the food we purchase and how to use this food to its full potential, with little or no waste. Delivering lessons that tackle the distinction between 'use-by dates' which are about food safety and the 'best before' date which is about quality and not safety is one example. Many supermarkets have removed 'best before' dates from hundreds of products and consumers have been encouraged to use a 'sniff test' to determine if the food still suitable to use; smelling some dairy products like milk for example to see if they have soured. We need to educate our students in school about how to use store cupboard items that are nearing the end of their best quality.

Allowing time in the curriculum, from an early age, to consider the seasons when selecting ingredients for recipes using fruits and vegetables, would also help. Allowing students to consider what is grown around them and the area they live could be another factor. Worcestershire's history and place names are scattered with the mention of pears, highlighting their past cultural and economic importance in the region. The Worcester Black Pear features on the city coat of arms and is associated with this area, but do the children we teach know this or eat our local produce? We need to consider how we promote local produce in our curriculum and recipes we select to cook with the students in our classrooms.



Our trainees believed they could develop a wide range of resource and activities to support the curriculum and engage students. They invited a class of Year 10 students to spend the day at the university with a focus on sustainability and reducing food waste. Consequently, they planned and delivered an exciting range of activities at university to a local partnership school. All the resources and planning have been shared with you here, via the embedded



QR code, in the hope that reducing food waste can become an area to develop within your own curriculum. The overview of the day sets the scene and provides evidence of the food waste issues we face here in the UK. The selection of recipes they developed and used reflected seasonal ingredients and commonly left over or store cupboard ingredients, offering possible solutions and understanding how to reduce students' own food waste at home as well as at school.



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## Hungry for equality!

**Beth Price and Annalise Haycock** are current UW PGCE Science students.

Many people are aware that the global food security crisis is one of the biggest challenges faced by our population, but few people are aware that women and young girls are disproportionately affected by extreme hunger; in fact, an estimated 60% of the world's chronically hungry people are female (ActionAid, 2023).

Unfortunately, gender inequality is both a driver and a result of food insecurity, and little has been done to ensure the basic human right of having sufficient access to food for women in the Convention on the Elimination of All Forms of Discrimination for Women (CEDAW) (Spielloch, 2011; ActionAid, 2023).

### ***Women's access to food is restricted by a number of factors***

According to the FAO, the concepts of food security can be broken down into four basic pillars: availability, access, utilisation, and stability (Food and Agricultural Organisation of the United Nations (FAO) 2006). In this article, we discuss how the gendered aspects of food security are visible across these pillars.

#### **Availability**

Women face a disproportionate inability to consistently rely on a sufficient quantity of food in comparison to men. Particularly within families that live in rural areas of countries with food scarcity, women's access to food is limited by a number of factors. Their 'traditional gender role' means that a high proportion of women (particularly within developing countries) spend the vast majority of their time as unpaid household workers, meaning their access to money is limited (Leonard, 1991). This has a knock-on effect on their access to land, credit and technologies which severely limit their ability to either grow or buy food. Studies

have suggested that if women had the same access to these resources as men, their agricultural yields could increase by as much as 30% (ActionAid, 2023). On a global scale, women only own around 20% of the land available for agriculture (Leonard, 1991). In many developing countries, there are still laws preventing women from owning land – many women cultivate land only by permission of their husbands. This instability means that women can lose this land and therefore access to food should their husband die or leave the family. Another restriction placed on women are the gender, cultural and social norms that also regularly restrict their access to jobs and markets, meaning that obtaining land can be impossible (Hovorka, 2006).



#### **Access**

Women's access to food is restricted by a number of factors. One major factor limiting access is physical constraint. Women, particularly in developing countries, face being less mobile due to the sociocultural norms that exist to keep women at home conducting free labour within households such as childcare.

According to these sociocultural norms, the man's role is generally to generate an income, which women are unable to do due to the time-consuming domestic responsibilities imposed on them (Leonard, 1991; Hovorka, 2006). In economic terms, this means that women in this position rarely have access to their own funds to buy food. This creates a vicious cycle where the men are more valued in terms of 'usefulness' to the family and the economy



– resulting in significantly less investment in girls’ education; and perhaps even worse, studies have shown that in times of food scarcity, male children in families generally receive preferential treatment in terms of food distribution over female children. This results in 41% of girls in food-insecure households facing severe food shortages, in comparison to 20% of boys (Leonard, 1991).

### Utilisation

The theory of intra-household bargaining has shown us that, historically, women have less of an impact on decision making in the household than their male counterparts (Leonard, 1991).

More recently, there has been a slight shift in focus, with women reporting a lower level of financial wellbeing than male partners (Lind et al., 2020). This is highly prevalent in areas of sub-Saharan Africa where women are almost never the primary decision makers, and this dynamic impacts their access to food within the family unit. In times of food-scarcity, it has been shown that women and girls are disproportionately affected – in one such study conducted in areas of rural Bangladesh, 14.4% of girls were malnourished in comparison with only 5.1% of boys (The World Bank, 2008). This highlights an inequality in women and girls’ ability to access sufficient food, and shows that they are more likely to suffer when food is scarce.

### Stability

Stability refers to adequate access to food for populations, households, or individuals that is stable over time (Quisumbing, et al., 2012). Instability can arise from many factors, such as: climate change, food-price shocks, financial and economic crises, and conflict and natural disasters (ActionAid, 2023). Women are more negatively affected by instability than men due to the differential roles that each gender plays in

society. For instance, women often have limited access to resources and information, increasing childcare and time burdens, limited geographic mobility, and less decision-making power. This makes it very difficult for them to prepare for and react to a disaster, relocate, or increase purchasing power (Asian Development Bank, 2013) and thus, access and afford food.



### Action

In order to meet the Sustainable Development Goal of ending world hunger by 2030 (Goal 2) (United Nations, 2015), it is imperative that researchers, aid donors and policymakers notice the

importance of gender equality in agricultural programs, and how it can be utilised to improve productivity. By addressing current policy issues, we can tackle the gender gap and empower disadvantaged women. Fortunately, organisations such as ActionAid are working to create sustainable livelihoods by: supporting women to access land rights, providing tools, technology and training to develop resilient female farmers, and by running cooperative farming schemes (ActionAid, 2023).

By tackling the gender inequality gap, we can not only ensure the provision of food for women, but we can improve global food productivity and ultimately tackle world hunger for all.

Links to the Science Curriculum AQA biology specification: 4.7.5.1 Factors Affecting Food Security. This article could make an excellent enrichment resource when discussing factors that affect food productions and conflicts arising from this issue. Science trainees have reflected on a variety of food related issues and created resources for the science classroom that you can find at the embedded QR code.



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## Future trends in population and food production

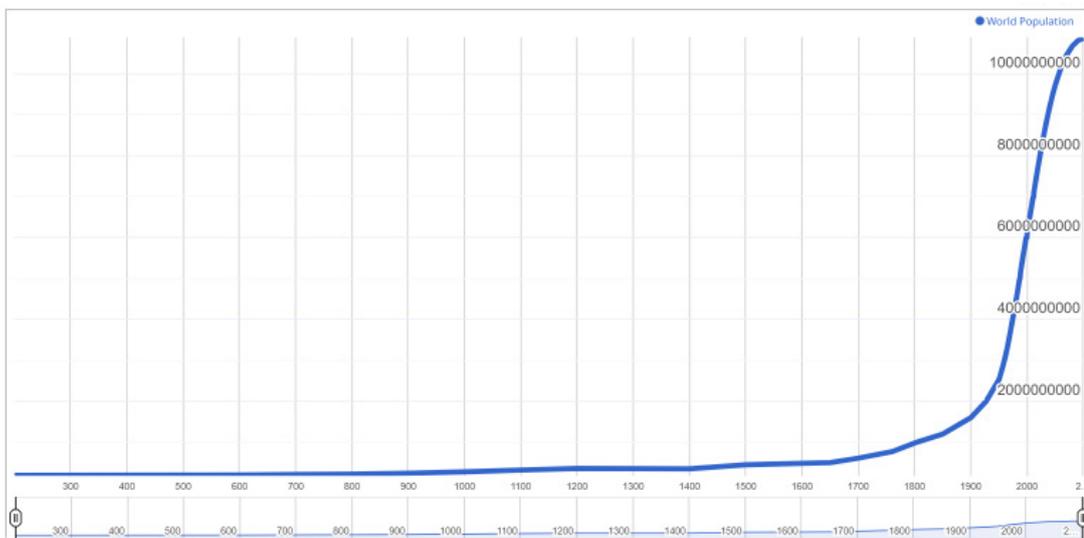
**Christine Watson** works within the University of Worcester PGCE Secondary team and School Improvement teams, leading CPD for local Maths Hubs. She is also currently Area Coordinator for Worcestershire and Herefordshire for AMSP (Advanced Mathematics Support Programme).

Currently (2023) the global population is just over 8 billion people but is projected to continue growing and to reach between 9 and 10 billion by 2050.

direct impact on population but people fleeing and becoming refugees leads to different types of impact.

- When there are too many people in an area compared to the amount of available food, the population is limited by that amount of food.

✎ Learners could be given the growth data, or explore the interactive graphs, and discuss which factors might make a population grow and which might limit that growth.



### Why is there such a big range in the predictions?

Mathematicians gather past data and analyse it. They create a model using equations and test it to see if it fits this historical data, adjusting it until it is a good fit. This model is then used to predict what will happen next. Mathematical modelling is big business!

However, any model has to also allow for changes: just because data has followed a particular pattern in the past doesn't mean it will carry on the same way. Changes in technology have a big impact and the model has to include an 'educated guess' about new technologies and their effect.

For population there are many factors that need to be considered, for example:

- When a country becomes better off, the children are healthier and fewer die young, then fewer are born. This leads to smaller families that live longer.
- When an area becomes unstable and there are more conflicts or wars, the conflict has some

Resource: <https://www.worldometers.info/world-population/>

✎ Alternatively learners could explore the growth data of specific countries – different groups looking at different combinations – and draw on knowledge from history, geography, business to identify where high and low growth occurs and why.

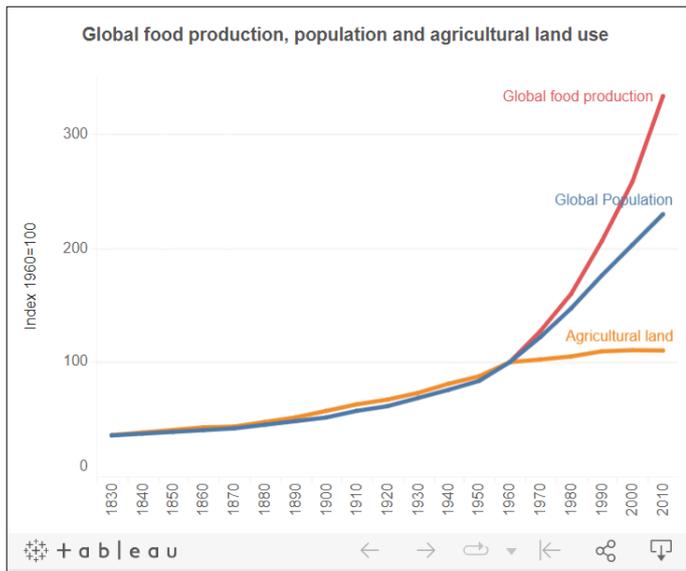
Resource: Interactive Population charts by country at <https://ourworldindata.org/world-population-growth>

This is a sensitive area for discussion in the classroom and needs to consider the backgrounds of the learners.

### How do we feed all the extra people?

Some estimates say that food production would need to increase by 70% to sustain this population. Currently food production is growing at a faster rate than the growth in population:





In 2017 it was estimated that around one third of food was wasted or lost annually – just under \$1 000 billion (\$1 trillion) worth of food.

**So what are the worries for the future – what are the barriers to ensuring that a population of 9.5 billion people can be fed?**

Stopping food waste would mean that there would be sufficient food to stop food poverty across the world right now.

So what are the worries for the future – what are the barriers to ensuring that a population of 9.5 billion people can be fed?

- Switch of agricultural land to biofuel production to compensate for reduced use of fossil fuels means less land available for food production.
- Increased food production needs more water which can impact on water quality.
- Higher production can destroy soil quality leading to over-use of chemicals; this is impossible to sustain over time.
- Population increase also leads to greater demand for housing, for jobs and therefore a shift from agriculture to accommodation and industry.
- Improving yields, but at the expense of quality: productivity v nutrition.

✎ Learners could consider some food crops and rank them using some or all of the following factors: which foods should the world increase production of, which production processes might need changing? N.B., this would need some research alongside the discussion.

- ✎ Learners could discuss their own food consumption. How could they improve the way they act as consumers to reduce their own impact? Could their family reduce food waste, or adopt a more sustainable diet?
- ✎ Learners could link areas of high population growth and low food production, and vice versa to search for long term opportunities to improve food supply. Or, look at inequity in food production and food consumption.

<b>Safety</b>	Is it safe to eat, or does it cause illness in the short or long term?
<b>Quality</b>	Is it nutritional, so does it promote health, or is it designed to be filling?
<b>Quantity</b>	What is the yield compared to the use of land, water, soil health, labour? Is it efficient to produce? What proportion of the produce is wasted – could this be reduced?
<b>Integrity</b>	Is it sustainable production long term, or is it damaging the soil or water or environment? For example, does the production process have a high carbon footprint? Is it ethically produced, eg comparing free range chickens with caged? Are the labour force throughout the production process treated fairly and equitably?
<b>Security</b>	Is this food production guaranteed or is it susceptible to changes in weather or to disease, for example the potato famine in Ireland due to disease, or crop failures in the UK due to excessive rain, or late frosts etc.
<b>Locality</b>	Can the food be produced near the consumers or is it transported long distances? Is it irradiated to keep it fresh – another process that may have long term health implications or may not!

Our global sustainability framework, the UN Sustainable Development Goals, includes a specific food waste target that maths educators could integrate into their teaching: 12.3: By 2030 halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.

Two of our maths trainees have explored the mathematical language of the IPCC at the embedded QR code and shared some resources that you might like to explore in your own classroom.



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## Escape from hunger. “Please sir, can I have some more?”

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Food in Literature, particularly from the 19th century, is often a construct or motif to illuminate something very profound. Novels written at the time of the Industrial and French Revolution feature attitudes to food to depict the glaring class divide, a cavernous gulf in many cases between the material rich and the starving poor. The author of the 1798 book *An Essay on the Principle of Population*: Thomas Malthus, concluded that human progress was doomed by simple mathematics. Put simply, his theory explained that the human population grows more rapidly than the food supply until famines, war or disease reduces the population.



It was inevitable that the demand for food would one day outstrip supply. When Charles Dickens wrote *A Christmas Carol* in 1843, the debates around Malthus’s theory would have been very familiar to the author.

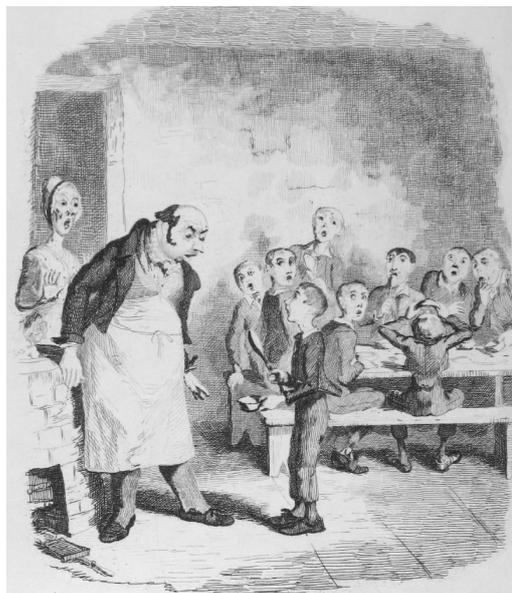
The Victorians were obsessed with human progress and whether humans were straining the earth’s limits. It is by no means a concern only raised in the 21st century! The ‘cavernous gulf’ in society couldn’t be more explicitly presented in this novella than from the description in Stave 3, when the Ghost of Christmas Present reveals to Scrooge the seemingly limitless variety and sumptuousness of the foods available to Londoners. “Heaped up on the floor,” we read, “to form a kind of throne, were turkeys, geese, game, poultry, brawn, great joints of meat, sucking-pigs, long wreaths of sausages, mince-pies, plum-puddings, barrels of oysters, red-hot chestnuts, cherry-cheeked apples, juicy oranges, luscious pears, immense twelfth-cakes, and seething bowls of punch, that made the chamber dim with their delicious steam” (p.52).

But hidden beneath the voluminous folds in his robe were two pitiful waifs representing want and ignorance, and not far from the vision of plenty was a family scraping together a meagre table, revealing how little of London’s bounty graced the likes of the Cratchit Christmas.

Over 150 years since the death of Dickens, his stories, rather than becoming irrelevant and assigned to the depths of history, resonate more than ever. His sharp and satirical commentary on the social injustices of the Victorian era shine a shameful spotlight on the food insecurity of our own times. Food poverty motifs are picked up by contemporary writers and social commentators such as Ken Loach whose texts, through the cultural medium of cinema, similarly expose readers to the shameful inadequacies of current welfare provision.

***Although both Dickens’ and Loach’s works are fictional, both act as representations for the ongoing difficulties many people across our country face in their daily struggle with food insecurity***

Although both Dickens and Loach’s works are fictional, both act as representations for the ongoing difficulties many people across our country face in their daily struggle with food insecurity. A precedent was set last year, when for the first time in history, the need for emergency food exceeded donations as the cost-of-living crisis drove more people than ever to seek support with daily living from their local food bank (The Trussell Trust, 2022).



The 1837 serialisation of *Oliver Twist* illuminated Dickens' bitterness and anger with the recently introduced Poor Laws. In the novel he satirises the supporters of the laws through his depictions of characters, like the Beadle Mr Bumble, who maintain corruption and inequality at a systemic level. Here Dickens frames Oliver's first encounter with a scrap of meat. This is foregrounded by a direct admonishment of the upholders of such a cruel system.

'I wish some well-fed philosopher, whose meat and drink turn to gall within him; whose blood is ice, whose heart is iron; could have seen Oliver Twist clutching at the dainty viands that the dog had neglected. I wish he could have witnessed the horrible avidity with which Oliver tore the bits asunder with all the ferocity of famine' (p.21).

*Oliver Twist* can be read as a direct criticism of the New Poor Laws of 1834 which deemed that the unemployed would be aided only in a workhouse, which was designed deliberately to be a dehumanising environment, discouraging the so called 'lazy poor' from asking for help. The pernicious Victorian sentiment of the "deserving" and "undeserving" poor came to pass and still abides today. A direct parallel has been made between this notion and current government policy to replace the

welfare state with the humiliating experience of visiting the food bank. Today, it is some of our hardest workers: the carers, cleaners, labourers and transporters of our society, who are forced to join the ever-growing queues as they find themselves in crisis and forced to choose between paying rent, heating homes or buying food for their family.



In a scene from 'I Daniel Blake', Loach depicts the central character's visit to the food bank. Kate is so hungry that she opens a tin of beans in desperation, breaking down in tears when she is seen eating from it.

The Union Workhouses of Dickens's day provided the gossamer thin lifeline for the starving poor. Although they existed for the most destitute, they did little to relieve the state of destitution. Scrooge, in the aforementioned *A Christmas Carol*, is glad they exist if it means he doesn't have to provide anything from his own wealth:

"And the Union workhouses?" demanded Scrooge. "Are they still in operation?" "They are. Still," returned the gentleman, "I wish I could say they were not." "The Treadmill and the Poor Law are in full vigour, then?" said Scrooge. "Both very busy, sir." "Oh! I was afraid, from what you said at first, that something had occurred to stop them in their useful course," said Scrooge. "I'm very glad to hear it" (p.35).



Fast forward to 2023, and the reliance on charities to tackle food insecurity is increasing. According to The Trussell Trust, <https://www.trusselltrust.org>, between 1 April 2022 and 30 September 2022, food banks in the UK distributed 1.3 million food parcels to people facing hardship – an increase of 52% compared to the same period in 2019. Perhaps even more alarming that half a million of these parcels were distributed to children and that one in five people referred to food banks in The Trussell Trust's network are in households where someone is working. Little has happened to 'stop them in their useful course', instead, the list of food insecurity charities such as: Fare Share, Action Against Hunger and Feeding Britain continues to grow.

Our PGCE trainees have created a set of English Language GCSE mock papers based on the issues and reading above. These can be accessed at the embedded QR code.



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## The implications of meatless religious festivities: removing meat from festival food?

**Rebecca Davidge** is the University of Worcester PGCE secondary subject lead for religious education. She has over 20 years teaching experience across a range of secondary schools in the West Midlands, including middle and senior management positions. Rebecca's research interests include Holocaust education, faith schools, diversifying the curriculum and inter-faith dialogue.

According to the Vegan Society (2020) almost half of British people who eat meat feel hypocritical for doing so as they both love animals and eating them. A study by the University of Oxford (2016) found that 8 million human lives could be saved by 2050 by switching to diets that rely less on meat and more on fruit and vegetables. More than 1 in 3 British shoppers have cut down on buying meat products, or who have cut them out altogether, in response to the cost-of-living crisis (Vegan Society, 2022). Has this shift towards concerns about the environment, human health and

God and an act of stewardship. The Jewish Vegetarian Society rejects any cruelty to animals basing their beliefs on the Torah which teaches kindness to all sentient creatures and that "we are partners with God in preserving the world" (JVS, 2023).

So, what would be the impact on believers if meat was removed from festival food? This question has led me to also ask:

- When food is used in religious rituals and ceremonies, it is the symbolism or the food itself that is most significant for believers?
- Would the food attract even more meaning if it was sustainability sourced?
- Could a vegetarian or vegan believer suspend their principles for reasons of religious ceremonies and eat symbolically-rich meat?
- What would your students make of these questions?



budget impacted the amount of meat we are eating and is this penetrating into religious practices, and should we be exploring this in RE?

Resources made for the RE classroom by Veganism in Education (VinE, 2022) claim veganism is a philosophy and way of life that is compatible with religious and non-religious worldviews. They argue that veganism is reflected in many religious teachings who see honouring animals as a commitment to

### Taking meat out of Jewish festivals

Let us focus on the place of meat in Jewish traditions. The Jewish Vegetarian Society (2023) argue that Judaism and vegetarianism are compatible and have scriptural principles to defend this intersection. The concept of tza'ar ba'alei chayimept means to prevent animal suffering and in Exodus 23:5 Jews are reminded to help an animal in need, even if it belongs to your enemy. Rabbinic law suggests that the Torah commands animal suffering must be

avoided. Some Jews argue that being herbivore is God's intended plan for humans, based on Genesis 1:29 "See, I give you every seed-bearing plant that is upon all the earth, and every tree that has seed-bearing fruit; they shall be yours for food". Additionally, there have been some precedents set in Jewish history. For example, Balsam (2020) reminds us that Esther ate a vegan diet in the Persian court and Tischler (2020) retells the story of Daniel who chose an animal-free diet when he was taken into the service of Babylonian King Nebuchadnezzar (which can be read in Daniel chapter 1).

***Has this shift towards concerns about the environment, human health and budget impacted the amount of meat we are eating and is this penetrating into religious practices, and should we be exploring this in RE?***

I asked a Jewish family living in Israel if the Seder plate used in Pesach celebrations could be vegan. Ronny said 38 family members would be celebrating together and one is vegetarian. She said for this person vegetable soup and aubergine pâté would be made to substitute for chicken soup and liver pate. She went on to say a vegan Seder plate is not the same, in her opinion, so it does change the event because "You lose the visual symbolism. That is what is missing, and you can't make it the same." Ofer, who is vegetarian, said the vegan Seder plate does detract from the authenticity and there is a problem replacing particular foods, the egg could be replaced by a round fruit to symbolise seed of life and the meat needs to be replaced by something edible and strong, maybe sugar cane which is strong, and the sugar gives energy. He said everything else is suitable for vegetarians.

***Veganising the seder plate***

According to Tischler, quoted by Balsam (2021), seder traditions can be adapted and he reminds us that Judaism has always evolved to meet the needs to people. The seder, the Pesach meal that relates the story of the Israelites from slavery to freedom, is a plate of symbolic food, most of which is vegan. But the zeroa (shank bone) and beytzah (egg) would need alternatives (Balsam, 2021). On the traditional seder plate, each food is symbolic of an idea, for example, the maror (bitter herbs) represents the bitterness of slavery, so in looking for a vegan



alternative to any of the foods, the original story needs to be revisited. The zeroa represents God commanding the Israelites to sacrifice a lamb to mark the doorposts so the Angel of Death would Passover their homes and not harm anyone inside. Instead, beetroot could be used. Balsam (2021) argues that beetroot does 'bleed' and could be evocative of the Passover sacrifice. The beytzah often represents the coming of spring and new life of the Israelites once they had escaped Egypt or it can represent mourning, for instance Jews might mourn those who never made it out of Egypt or the Egyptian soldiers who drowned in the Red Sea. Balsam (2021) suggests a vegan alternative could be a round rock, since it is traditional for Jews to place stones on graves as an act of mourning.

Our UW PGCE RE trainees have created a series of activities for the classroom, available at the embedded QR code.



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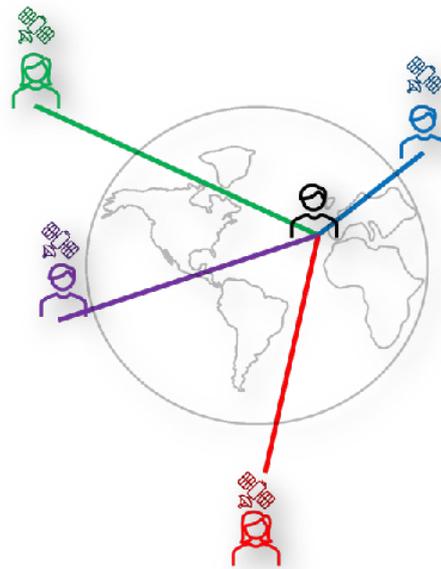
## Digital farming

**David Hunt** is the University of Worcester PGCE secondary subject lead for computer science. He spent 22 years in a range of teaching and management roles in UK and international secondary schools before moving into higher education. He established the computer science PGCE in 2013 and has research interests in Technology Enhanced Learning. In his spare time, he designs devices that can be used on the Internet of Things (IoT).

The world population is growing and according to the United Nations (2013), there will be a need to grow up to 70% more food by 2050. As land and water resources are limited, farmers need to be increasingly efficient to grow more food in the same space. The amount of useable food that a farmer can grow on their land is known as the yield.

The weather is often unpredictable, but it is important that crops in the fields have the right amount of water to grow. If there is too much water, the plants can rot in the ground. If there is not enough water, they can shrivel and die. If a computer is used to monitor the water content of the soil, it can decide to turn on the water supply to irrigate the crops. Sensors located in the field can monitor the amount of water in the soil and inform a computer system whether to turn on the watering system or not. This ensures that plants get the optimum amount of water to grow but it also preserves the water supplies by not watering the plants unnecessarily.

Tractors are now equipped with global positioning system (GPS) receivers, so they accurately know their location on Earth.



These devices enable a farmer to plough a field and plant seeds within the field boundaries. When it comes to the time to harvest the crops, the farmer can use the co-ordinates that were stored when the tractor planted the seeds, to ensure that all the crops are collected in. Farmers understand the need to attract insects to their crops, as the insects are pollinators and are necessary for the plants to form the seeds.





To help provide a good habitat for the insects, farmers often plant wildflowers around the edge of their fields, which is known as a field margin (Fairfax, 2022). The large variety of wildflowers provides a bio-diverse environment for the insects, attracting them to the area. The farmers would not want to damage these field margins, so it is important that the tractor can accurately repeat its route around the field. Fortunately, modern GPS systems can accurately steer the tractor around the same route within a few centimetres of its original pass.

The way that GPS works, is that a receiver picks up a radio signal from a satellite. The signal includes time and location information. The receiver on Earth also has a clock on board and will know how long the signal took to arrive. It can then calculate how far away the satellite is using a simple formula ( $\text{Distance} = \text{Speed} / \text{Time}$ ). To be useful, the receiver needs to collect information from four or more satellites, so that the location on Earth can be calculated. Try the unplugged activity (via the QR code) to see how

***If the tractor is able to plant the seeds, deliver the fertilizers and finally crop the plants by using the same route, it is possible to maximise the amount of plants that are harvested from a fixed amount of ground***

this is done. There are some other benefits of being able to map a very accurate route over the field of crops. When a tractor drives over the field, it can damage the crops underneath the tyres (Botta et al., 2018). If the tractor is able to plant the seeds, deliver the fertilizers and finally crop the plants by using the same route, it is possible to maximise the amount of plants that are harvested from a fixed amount of ground. The positioning is so accurate, that the tractor can drive in exactly the same tracks that it used last time. It has been shown that crop

yields can be increased by up to 12% using these techniques (S&P Global, 2020). By following a fixed course, the human factors in driving inefficiency can be reduced too...the farmer will not be wandering off track or over-revving the engine. This will minimize the amount of fuel that is required.

A fully autonomous tractor is one that does not need a human to drive it and they are available to use now (John Deere, 2022). As well as the GPS technology that is used to locate the tractor, it also has other systems to make sure it can be used safely. Six pairs of cameras are used to give a 360 degree view around the tractor. The images are sent to a graphics processing unit (GPU) that is similar to the ones found in games consoles. The video images from the cameras are processed very quickly to help detect any obstacles in the way, such as animals, people or other large objects. The computer system is able to stop the tractor and send the images to the farmer's smartphone to check.

Certain types of farming activities can only be completed when the conditions are right. Ploughing and seed planting cannot be done if the fields are too wet. A robot tractor is not limited by daylight hours as it can operate in the dark. This means that tractors can be used 24/7 and take advantage of the good weather conditions, even if it has to operate in the night-time. Human farmers need to drive the tractor in daylight so they can see they are driving in straight lines to plough the fields and harvest the crops accurately. Farmers also get tired and need to take regular breaks.

These technologies are now well established, and consumers can buy a version of it for their own gardens! Robot lawn mowers have started to appear in the shops and they are able to find the charging station to top up their batteries and mow the grass, without any human intervention. Welcome to the future.



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## Why is sustainability important in Business?

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In 2021 the total consumer expenditure on food, drink and catering was £240 billion in the United Kingdom (UK) (DEFRA, 2023). In addition, further evidence that this is a significant industry is cited by Statista (2022) as consumer expenditure in restaurants and cafes in the UK was £92,320 million from 2000 to 2021. Further investigation of the food industry market reveals the growing importance of plant-based foods to consumers, with the strongest sales to Gen Z who are defined as those in the 11-26 age range (Mintel, 2019).



Analysis of agricultural land use and food production highlights that more land is required for pasture and producing feed for animals than it would be to produce food directly for a vegan diet. With a limited supply of agricultural land, and the demand for food increasing with a growing worldwide population, the efficient use of land in food production is critical. Consideration also needs to be given



to the carbon emissions for different crops and animals. The Economist (2022) posits that “beef farming produces 31 times more CO<sub>2</sub> emissions than tofu production” and that “eliminating meat, fish, dairy and eggs would reduce emissions.” Land use and emissions inform the changing needs that influence the food industry and impacts on consumer trends in the market. A report produced by the Office for Agricultural Affairs on the overview of the plant-based food and beverage market in the UK indicates that “UK demand for plant-based meat and dairy alternatives has boomed in recent years, doubling in value from 2016 to 2020 to around

***Analysis of agricultural land use and food production highlights that more land is required for pasture and producing feed for animals than it would be to produce food directly for a vegan diet***

\$1.6 billion at retail” (United States Department of Agriculture, 2022). When considering the increased demand for plant-based products, it is important to recognise the impact of education in awareness of carbon literacy and sustainability. Mintel (2019) attributes the rise in demand for plant-based food and beverages to the growing awareness of the importance of sustainability and the benefits of eating less meat to improve the environment and help to improve health along with saving money.

PGCE Business and PGCE Business with Economics trainees investigated the impact of the trends towards plant-based food on the restaurant industry. Trainees were inspired by 'One Planet Plate', a worldwide restaurant campaign, aimed at combating issues in the food system by inspiring chefs in restaurants, and those cooking at home, to consider and act on their food choices (One Planet Plate, 2023). They explored a wealth of recipes which feature using more local produce, vegetables, sustainable seafood, and foods with a low carbon footprint. Trainees considered how they could use this knowledge to inspire Year 7 pupils in an Enterprise Day that they subsequently successfully planned and delivered in school. Their sequence of learning set the scene with sharing photos to identify environmental problems and possible solutions, sustainability



in businesses, sustainable development goals (SDGs), and food. Following a food fact quiz pupils were set the challenge of creating a sustainable dish for one of three restaurants. Pupils calculated the greenhouse gases and financial cost for their dish before pitching their product to the business owners. These resources can be accessed via the embedded QR code.

Sustainability is not only an important aspect of enterprise education but is also a strength of the Business curriculum in Key Stage 4 and Key Stage 5. Sustainability has been on the radar of large businesses for well over 15 years, thrust into the limelight in 2007 when Marks and Spencer launched their sustainability initiative 'Plan A'. Companies of all sizes strive to reduce their carbon footprint and become more sustainable alongside maintaining profits; even Ryanair, who are well known for charging their customers for every little thing, offer their

customers the opportunity to offset their carbon whilst booking the flight. It could be questioned as to whether this is because they want to be more environmentally friendly, or whether they recognise that the idea is important to some of their customers, and this is how they can be seen to be meeting their needs.

It is important that sustainability is embedded in the curriculum for Business. At Key Stage 4 the topic of sustainability is embedded in all the 9-1 GCSE specifications, appearing in both exams for AQA. This leads to a great opportunity for students to grasp the importance of this topic, and why ethics and sustainability should not just be a tick box exercise for a business but is, in fact, essential to the businesses ongoing survival. There is an opportunity to teach about the different ways businesses can operate more sustainably, and the benefits and drawbacks of this. For example, when studying a plant-based market students can investigate how brands find ways to differentiate their products to appeal to their target market.

Good teaching is not about teaching to the exam, but about students having a greater depth of understanding. The sustainability topic is an opportunity to investigate lots of different businesses and find out what they are doing to be more sustainable. This research can then easily lead into discussions surrounding the impact on profits and whether the investment is viable or not. Students can learn about the concept of trade-offs and why sustainability doesn't always need to be a trade-off. This isn't a stand-alone topic either and relates to many different aspects of the new curriculum including aims and objectives, stakeholder influence, finance, and marketing to name just a few.

The KS5 curriculum is also rich with opportunity to discuss the concept of sustainability and its growing importance in Business. The BTEC curriculum offers numerous opportunities for a focus on this topic, often using PESTLE analysis which is required as part of multiple different units. A unit dedicated to the concept of Corporate Social Responsibility gives opportunity for teachers to write their own assignment briefs on this topic to make the unit more engaging for their students and help them understand its importance. Considering the impact of the current cost of living crisis it's now more important than ever that teaching about sustainability in Business is strengthened in the curriculum.



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## The role of psychology in promoting sustainability

*Amelia Malcolm, Meghan Davies, Alice Farmer, Giana Perera and Sophie Rushton are current PGCE Psychology trainees.*

A key link between combatting the climate crisis and Psychology is food sustainability. A major topic within psychology is the effects of food insecurity on people's mental health. As educators, teaching young people about the climate crisis alongside the curriculum is invaluable in informing them of how society can make their future a better one.

### What is food sustainability?

Sustainable nutrition refers to the ability of food systems to provide ample nutrients to people's diets, without compromising the quality of the climate or future generations' ability to obtain a balanced diet. A product is deemed sustainable if it non-toxic, uses increasingly smaller amounts of material, and is based on renewable and non-polluting processes and materials. If a product is easy to maintain, process, dismantle, demolish, dispose of, and recycle (Di Fabio, 2016a), is it considered to be sustainable.

### How does sustainability relate to food insecurity?

Food insecurity is set to become an increasingly worrying trend, with 1.7 billion people at risk of increased poverty due to the Ukraine crisis & the cost-of-living crisis – one that was already brewing prior to the conflict. (Concern worldwide, 2022)

***Psychological research has found that food insecure populations are significantly more susceptible to developing psychological disorders than food secure population***

### What is food insecurity?

A person is food insecure when they lack regular access to nutritious food, which may prevent normal growth and development. This is often due to a lack of resources to obtain food, such as living in poverty.

### What are the effects of food insecurity?

Psychological research has found that food insecure populations are significantly more susceptible to developing psychological

disorders than food secure populations (Gyasi, Pephrah & Appiah, 2020).

There is sadly additional research to suggest that those with higher levels of depressive symptoms, who also classify as food insecure, have a larger susceptibility to developing eating disorders, especially in relation to binge eating (Gardizy, Lindenfeldar & Paul, 2023).

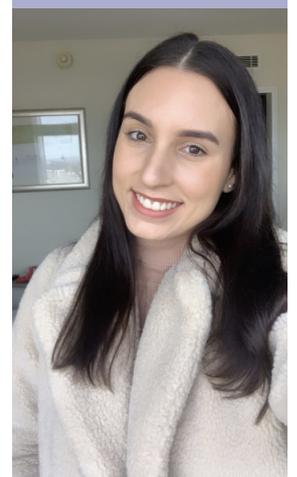


### How will eating sustainable foods decrease the food insecure population?

A sustainable food system refers to one that "provides healthy food to people and creates sustainable environmental, economic and social systems that surround food" (Wikipedia, 2023). Buying and consuming sustainable foods will help to decrease CO2 emissions and in turn the climate crisis, which will aid biodiversity. Biodiversity is of high relevance to critical life issues such as hunger eradication, poverty reduction, health and sustainable economic development. Many economic sectors depend on biodiversity and ecosystem services, including agriculture, fisheries, forestry, health, nutrition, energy and tourism. The world's fisheries employ approximately 200 million people, and have a value estimated at USD 80 billion. Insects and other animals that transmit pollen, especially for fruits and vegetables, are estimated to be worth more than USD 200 billion per year to the global food economy.

### What is the role of social influence in promoting food sustainability?

A vast amount of research has been done into how companies influence our choices and persuade us to buy items we did not originally have a desire to buy. Food companies pay shops more to position food at eye level, which increases the chances of it being purchased. These big companies are often the ones which are less eco-friendly.





An important aspect of conventional retailing is store layout (Vrechopoulos et al., 2004). Store layout can be considered one of the most important factors affecting consumer behaviour and a critical determinant in the creation of store image. (Tlapana, 2009).



Shoppers visit specific branded supermarkets for gratification shopping, value shopping, to search for good service and product quality, social shopping and brand hunting (Mahlangu et al., 2019). The most important attribute customers consider when choosing a supermarket is cleanliness of the supermarket, followed by ease of locating the merchandise and value for money (Makhitha, K.M., 2014). Using this context, it is proposed that pupils could explore this in an activity relating to how psychological social influence can be utilised to create a more sustainable food-purchasing habit within consumers.

**Reflections and intentions**

As educators, how can we ensure our students are informed on the climate crisis and how the world plans to combat it? Being psychology teachers, we hold the view that educating students on how to be more food-sustainable will not only be a step in the right direction in contending food insecurity, but will also provide them with insight into how this can be achieved. Our PGCE Psychology students have created some resources, available at the embedded QR code, to help you explore this in your own classroom.



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## Food 4 thought

**Kimberley Hibbert-Mayne** is the coordinator of the University of Worcester PGCE secondary professional studies programme and a member of the PGCE secondary physical education tutor team. She has worked in education for the last 16 years as a physical education teacher in secondary schools before embarking on a career in teacher education in 2015. **Tom Schafer** is a current PGCE PE trainee. **Dave Woodward** is the University of Worcester PGCE secondary subject lead for physical education. He spent over 10 years in secondary teaching. He is an examiner and moderator for Edexcel/Pearson GCSE PE. Dave has presented at TEAN conferences and had several articles published in AfPE journal.

### Introduction

This article, and the developed resource, is inspired by the Eatwell Guide (Public Health England, 2016), a well-known resource used in secondary schools. More specifically, it is used in Physical Education (PE) to support students in learning about healthy eating habits and athletes' diets as part of the curriculum at various stages (e.g. GCSE, A Level).



The guide was first developed for the general public as a simple and visual representation of a healthy and balanced diet. It includes a variety of foods from each of the major food groups: fruits and vegetables, carbohydrates, proteins, dairy or dairy alternatives, and oils and spreads. While the Eatwell Guide and its food groups have been adapted to be more accessible over the past three decades, we believe it may not go far enough in assisting PE teachers with the 'food literacy' (Meyer, Reguant-Closa

& Nemecek, 2020) needed to be inclusive in today's classroom. Young people have different values and perspectives regarding food, and pupils must not feel alienated when discussing a healthy and balanced diet.

**A survey by BBC Good Food (BBC Newsround, 2021) found that 20% of children follow vegan or vegetarian diets, with many more young people expressing an interest in food production which is more sustainable**

In the current economic and rapidly accelerating global warming crisis, we wanted to create a resource encouraging PE teachers and students to explore different foods' nutritional value, sustainability and cost. It is hoped that such information will make students feel personally included whilst being better informed to engage with aspects of the PE curriculum.

### Cost of food

Students' socio-economic circumstances must be considered to effectively promote healthy eating (Fismen, Samdal & Torsheim, 2012). For example, when studying the latest dietary trend to improve an athlete's performance, it is essential to remember that students in our classrooms will be seeing and experiencing very different dietary habits in their own lives. Many UK households cannot access sufficient quality or quantity of nutritional food (Smith et al, 2022). PE teachers and students can use the attached resource to cater (scan the QR code) to athletes at different levels of the sports development model while implicitly empowering those from lower socio-economic backgrounds to question their eating habits.

### Sustainability

A survey by BBC Good Food (BBC Newsround, 2021) found that 20% of children follow vegan or vegetarian diets, with many more young people expressing an interest in food production which is more sustainable. Various research suggests that vegan and vegetarian diets have a lower environmental impact than omnivore diets (Chai et al., 2019; Jones et al., 2016; Aleksandrowicz et al., 2016). Reducing the impact that diet has on the environment can be done in three





protein choices. Protein sources are the most significant driver in environmental impact regarding diet. For example, red meat causes nine times more greenhouse gas emissions than poultry (Meyer, Reguant-Closa, and Nemeck, 2020). Notably, tofu has a lower impact than animal-sourced proteins (Poore and Nemecek, 2022), which is not specified in the Eatwell Guide. The resource provides teachers and students with flexibility, so everyone in the classroom can engage in dietary planning that fits their personal values or dietary needs.

It should be noted that while plant-based alternatives offer better sustainability options, the nutritional quality of animal-sourced foods is higher (Berardy et al., 2019; Tessari et al., 2016; Saarinen et al., 2017). Consequently, ‘flexitarian’ or ‘semi-vegetarian’ diets have been suggested to help counteract environmental issues. For example, eating no more than 300 grams of meat (or less than 100 grams of red meat) can significantly reduce the environmental impact of an individual’s diet (Willett et al., 2019). Once the resource has been used as a guide for cost and sustainability options, it would be up to

a PE teacher and their students to analyse the difference in nutritional values.

main ways; controlling food waste (Beretta and Hellweg, 2019), considering the seasonality of fruits and vegetables (Meyer, Reguant-Closa, and Nemeck, 2020), but maybe most relevant to the PE curriculum, is the consideration of



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## Hunger in Worcester: exploring local food security

**Elena Lengthorn** is the University of Worcester PGCE secondary subject leader for geography. She spent 15 years teaching secondary geography and science before joining the University of Worcester in 2017. She was awarded 'Global Educator of the Year' in 2016. Her research interests include flood education, Education for Sustainable Development and Climate Emergency. **Ruth Allsopp** is the Operations Coordinator at Worcester Foodbank. She previously worked in the technology sector at a local Worcester business for 9 years, before making a career change to the charity sector, looking to use her operational and management experience to benefit her local community. Her role at Worcester Foodbank, which is funded through an ASDA grant, involves supporting the team of around 90 volunteers in effectively and compassionately delivering food to those in need.

Food features in the geography national curriculum in England at KS3, 4 and 5 in terms of food as a resource and in its management. In 'thinking like a geographer' our learners' exploration of food resources can concern the local and the global, as well as considering how decisions made at different scales have global impacts (Ofsted, 2021). Study of our local Foodbanks can help us explore food as a resource, its management and in valuable contemplation of our interconnectedness.

***The effects of food insecurity on our pupils is varied, from poorer academic performance and anxiety, as well as school absence and other physical and behavioural issues. What action is your school taking on pupil hunger? How is your department supporting food insecure pupils?***

In 1996 the Rome Declaration on World Food Security and the World Food Summit Plan of Action outlined routes to the common objective of food security at a range of scales, from the individual and household, to national and global levels. (Rome Declaration, 1996). Based on this summit the World Bank (n.d) defines food

security as:

"When all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life."

(World Bank, n.d)



Food security then, a measure of people's access to safe and nutritional food, is determined by a number of factors. From the availability to the affordability of food, it can be measured at the household, community, and national level and impacts us all, whether directly or indirectly, from undernutrition to social unrest.

The World Bank (n.d) outlines four distinct dimensions of food security that must be fulfilled simultaneously in order for food security to be achieved:

1. Physical availability of food
2. Economic and physical access to food
3. Food utilisation
4. Stability of these dimensions over time

### Food security in the UK

The House of Commons (2022) highlights that since 2010 our food system has been negatively impacted in a number of ways, including our departure from the EU, the Covid-19 pandemic, as well as greater impacts from climate change (Parliament, House of Commons, 2022). The UK government and the IPCC have identified climate change and biodiversity loss as a major contributing factor to UK food security (Parliament, House of Lords, 2022). There will be an impact on the resilience of the UK's food supply with weather extremes damaging crops, livestock and fisheries, damage to farming infrastructure impacting productivity, and the potential for a 20% (mean) increase in our food prices globally by 2050. These increases are already being felt, in the UK and around the



world, with consistent rises for the 17 months to December 2022 when food price inflation was at its highest since 1977.



Research from The Trussell Trust (2022), an NGO and charity that works to eliminate the need for food banks in the UK, showed that 40% of citizens on universal credit had visited a food bank at least once during April 2022 and 320,000 people had used food banks for the first time (a 40% increase in new users compared to 2021). This is an emotional matter: hunger is a growing issue for our pupils, our teachers and our wider communities.

**The need for sensitivity**

Hunger and food insecurity are highly sensitive topics. Recent research from the Food Foundation (2022) suggests that an alarming increase in food insecurity is affecting children in the UK, with 26% of households with children experiencing it in the month prior to the publication (September 2022).

A proportion of our students and colleagues will likely be experiencing some level of food insecurity and we must proceed with caution in situations where students & staff may feel uncomfortable discussing their personal experiences and it is essential that we work to avoid the stigma and anxiety of food poverty.

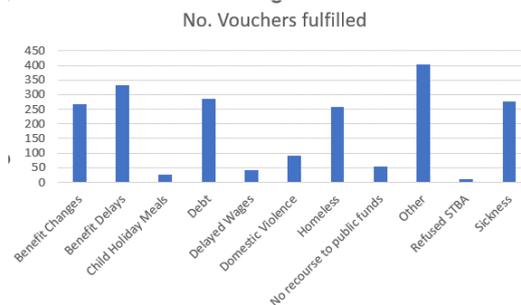
The effects of food insecurity on our pupils is varied, from poorer academic performance and anxiety, as well as school absence and other physical and behavioural issues. What action is your school taking on pupil hunger? How is your department supporting food insecure pupils?

It's important that our learners begin thinking about system-level causes and responses to food security problems, whilst also having a sense of local concerns. Connecting pupils, through a case study, site visit or visiting speaker, to the important and active work of their local food bank to alleviate hunger, is one way that you might develop empathy and a sense of social justice in your pupils, as well as providing much needed community support for their crucial work.

**Worcester Foodbank case study**

A referral system of collaborating organisations, such as doctors, social workers and Citizens Advice, exists to refer people for food vouchers for emergency food support. The reasons for food crisis are many and varied. The crisis attribution for Worcester Foodbank are shown below. It is crucial to remember that the client's situations are very often complex, with multiple events impacting on their situation.

**Reasons for food crisis**



'Low Income' has been removed from the graph as it is chosen as the main reason significantly more than any other category (over 1500 vouchers). Low income covers those on benefits and not earning, earning but not on benefits and those on both.

**The distribution of the food crisis**



The data shows that there is a large amount of need in large housing estate areas but also in city centre areas. 'NFA' which appears in the graph indicates those who come to us with no fixed address. These people may be in temporary accommodations, sofa surfing or homeless.

**Who is in food crisis?**

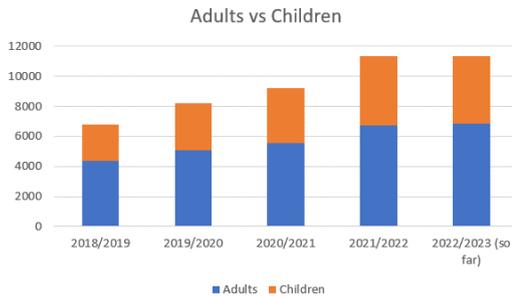
The graph on the next page shows the split between children and adults in the 'People Fed' data. The trend shows that the number of children being fed has increased proportionately over recent years. There has been an increase in the number of families needing the services of the Foodbank.



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**Food Security in ITE**

The UW PGCE Secondary Geography programme includes an opportunity for trainees to visit the Foodbank to learn about the Foodbank processes, their dedicated volunteers and the community that their work supports, as well as developing their own knowledge and case study on food insecurity to use in their own teaching. They volunteered for a morning, getting involved in the picking and packing processes, as well as discarding a significant amount of inappropriate, out-of-date, and out-of-packaging food donations.



**Trainee reflections**

“It really resonated with me how much more I could be doing to support our local community. Working in a supermarket, it’s easy to feel vicariously reinforced by the donations given to local charities at the end of the day, the donations of small amounts to our collection point, but am I doing enough given that I have far more opportunities to support those most vulnerable?”

Lizzy Vizard

“It was quite a profound experience for me. It was a beautiful thing to see so many people volunteering there to help those in need, and

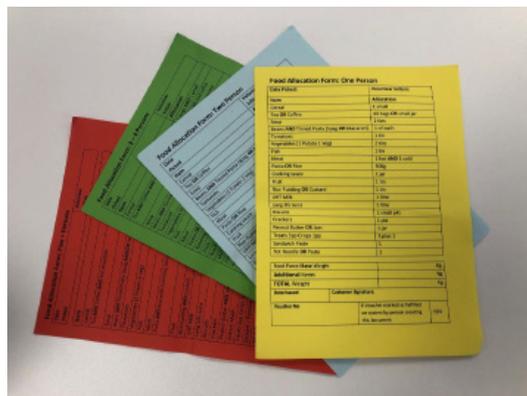
how much care and work they put into making sure everything is stored and sorted properly. It also saddened and frustrated me. I was sad over the fact that these foodbanks are needed at all, when making sure the people of the UK are all fed properly and have the essentials should be a governmental responsibility, not just resting on the shoulders of volunteers, donors and local businesses. I felt frustrated in my experience there of seeing so much of what was donated going to waste. Much of the food that was donated had expired by, at best, a few months and, at worst, a few years. Donating expired food is not helpful to those in need; a food bank is not somewhere to dispose of food that is expired. It distresses me that many of my pupils and their families are going to be relying on foodbanks when access to food and essential products is a basic human right. The visit highlighted just how easy it is to suddenly need a food bank out of the blue.”

Emily Whitehouse

“I was taken aback by the sheer scale of food poverty within Worcester. During a discussion with the manager it was disclosed that 40% of Worcester city inhabitants receive some benefit to make ends meet. This got me thinking about the young people coming into my classroom hungry and the effects this could have on their learning.”

Graham Lund

Our inspired UW PGCE Geography trainees have created a series of food related activities for the classroom, available at the embedded QR code. From a look at ‘Food as protest’ with KS5, to the food supply chain activities for KS3.





## ENSURE INCLUSIVE AND EQUITABLE QUALITY EDUCATION AND PROMOTE LIFELONG LEARNING OPPORTUNITIES FOR ALL

### COVID-19 PANDEMIC

HAS DEEPEINED A

**GLOBAL LEARNING CRISIS**

**147 MILLION CHILDREN**  
MISSED OVER HALF  
OF IN-PERSON  
INSTRUCTION

IN 2020-2021



### 24 MILLION LEARNERS

(PRE-PRIMARY TO UNIVERSITY LEVEL)

**MAY NEVER**

**RETURN TO SCHOOL**



### EDUCATION IS A LIFELINE FOR CHILDREN IN CRISES

ENTRENCHED INEQUITIES IN EDUCATION HAVE  
ONLY WORSENEED DURING THE PANDEMIC



**REMOTE LEARNING**

IS OFFERED TO

**3 MILLION**

UKRAINIAN CHILDREN  
IN THE CHAOS OF WAR

(APRIL 2022)

MANY COUNTRIES ARE **IMPROVING** SCHOOL INFRASTRUCTURE AS CLASSROOMS REOPEN

GLOBALLY,  
PRIMARY SCHOOLS  
(2019-2020)



ELECTRICITY



CLEAN  
WATER



BASIC  
SANITATION



COMPUTERS



INTERNET  
ACCESS

## Food security

**Dr. Fran Dickson** is a current PGCE History trainee. Fran was assisted by Rachael Moore, and Grace Morin. **Rachael Moore** is the University of Worcester PGCE secondary subject lead for history. She spent over 17 years in secondary education, before moving into a career in ITTE. Rachael was subject leader for History with another ITTE provider from 2014-2018 and associate lecturer in history education at the University of Bristol. **Grace Morrin** is a current PGCE History trainee.

'Give us this day, our daily bread'. An entreaty familiar not just to practicing Christians but much more widely. For Marx, 'a man must eat before he can think'. Food is essential to survival, and its provision is a central responsibility of the state, a fundamental strand of the social contract between citizens and their governments – both modern and historic. The resulting 'politics of provision' (Bohstedt, 2016) cut right to the heart of some of the most contentious episodes in history; for when a state fails to ensure the basic needs of its people, it has failed. Both the consequences of failure and the efforts to prevent it can lead to events of enormous historical significance. We don't need to look too far for evidence of the impact of the politics of provision, there is plenty in our own history. New research demonstrates that it was to uphold not just access to wheat, but wheat at affordable prices, that drove wartime Prime Minister Asquith to assent to the disastrous Gallipoli campaign (intended to open the flow of Russian wheat, relieving shortages and secondarily providing Russia with much needed funds without resorting to further loans from the British Government), reasoning that it would be easier, and cheaper, to 'storm the Dardanelles' than to take other measures to avert food riots at home (Lambert, 2021).



Asquith didn't fear food rioting on the home front without good reason. Britain has a rich history of public protest and riot in response to food shortages, particularly of wheat.



These riots peaked during the 18th Century, during which time 2 of every 3 'disturbances' were to do with food. Archer (2000) discusses the variety of actions and targets of these disturbances; violence wasn't always explicit but might be threatened, violence when it did occur might be directed at farmers, middlemen or shopkeepers, food seizures and profiteering were also common. What they had in common, however, was the objective; to secure a greater supply of food for the community. This peak of food riots spoke to a wider change in society: industrialisation. Britain had recently moved from an agrarian system to one in which people no longer grew their own food, and there was a new system under development. This system was newly complex and commercialised, involving processing and transportation, including from overseas; in other words, it contained the ideal conditions to provoke "dearth riots" (Bohstedt, 2016). These conditions may not exist in modern Britain to the extent that they are necessary and sufficient to cause violent protest, but we see echoes of them all around us. The current cost of living crisis in the UK has significant food insecurity: food price inflation reached 13.3% in December 2022, and one of every five people and one in four children lived in poverty in that same year. Even before the full effects of inflation became evident, The Trussell Trust was distributing record numbers of food parcels, amounting to 1.3 million parcels between April and September 2022. The war in Ukraine has demonstrated once again the complexity of the global food chain and the ways in which food can be weaponised against populations both directly and indirectly. The dependence in Britain on imported food has been highlighted by the current shortage of staples such as tomatoes and salad; not threatening our daily bread perhaps, but our 5 a day.



One response to the ‘tomato shortage’ of 2023 has been for supermarkets to ‘ration’ items, something we also saw during Covid-19. A poor harvest, freak weather, distorted market conditions, Brexit, Covid-19, for all sorts of reasons the concept of rationing has become more familiar to British ears than we might have expected.

***The dependence in Britain on imported food has been highlighted by the current shortage of staples such as tomatoes and salad***

The point of rationing is, of course, to prevent food running out, and to establish an element of fairness or equity in times of shortage; for the state, or the supermarket, to retain some degree of control and prevent chaos – or rioting. Britain’s experience of state-rationing has so far been limited to World War One and Two, and their post-war periods; the last item to be ‘off-ration’ was meat in 1954. Though fruit and vegetables were never rationed, they were sometimes in short supply. Bread, the ultimate staple, was not rationed until after the Second World War had ended, being introduced in 1946; a political and ultimately contentious move reflecting the Government’s desire to remain a ‘world power’ despite its paucity of financial reserves. Rationing in both WWI and WWII was credited with reducing rates of malnutrition, despite the context of food shortages, reflecting the fact that food was distributed more equitably and that crucially the diets of those in poverty improved. Rationing has two faces: it is paternalistic, speaking to the social contract between a government and its people to ensure the supply of basic goods on the one hand, but at the same time it is a measure of austerity and intrusion, and many in 1946 felt they had made enough sacrifices already. Protest by women such as Irene Lovelock, founder of the British Housewives

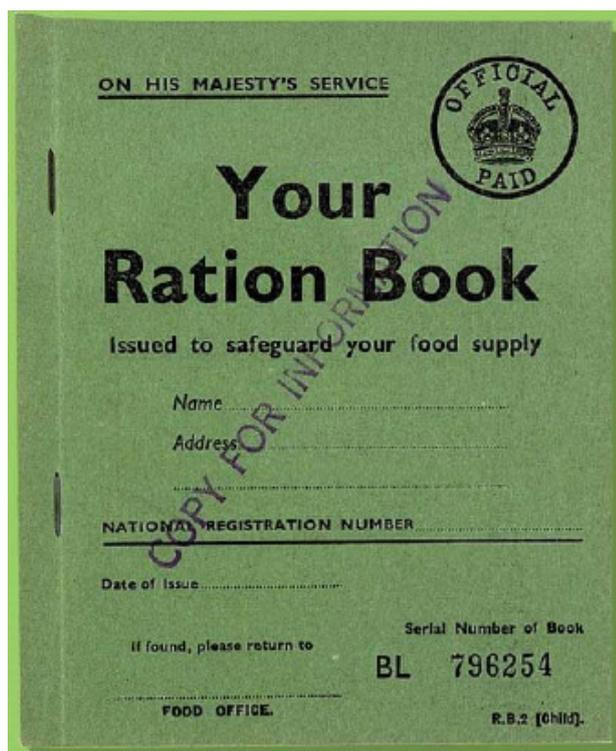
League, against the hardship of queuing and the government’s continuing involvement in society demonstrate the depth of the anger that these policies promoted, as well as providing us with evidence of the growing willingness of women to speak out against the government (Sendall, 2019). Should we be surprised, therefore, to see rationing back on the public agenda, not just by supermarkets in response to a temporary shortage but as a policy that could be beneficial to both our own health and the environment? A new paper published in the journal ‘Ethics, Policy and Environment’ argued that carbon rationing may be the best way to tackle greenhouse gas emissions, whilst newspapers are recently full of commentary suggesting rationing as a way to tackle the problems ranging from food waste to obesity (Wood, 2023).

Because food is essential to life, the politics of provision are never far away. Globally, food supplies are insecure. In the wake of the 2008 financial crisis, we saw widespread food riots in countries such as Kenya, Mozambique, Bangladesh and India. The Institute for Development Studies considers food riots to be marked by the loss of a state’s ability to provide

for the basic welfare of its citizens, something that is both a symptom of economic change or instability but also – crucially – frequently the instigator of change and have been known to usher in “new forms of accountability for hunger” (Institute for Development Studies, Food Riots and Food Rights Research Project). Seeing food riots and the politics of provision as both a symptom of and catalyst to change is fitting, we should look to our histories of bread rioting and rationing (and the varied responses to

it) both as viewfinders, highlighting the socio-economic and political systems as they were, and as part of the story of how our current system came to be.

Our PGCE History trainees explored these themes, and we include a food riot resource that you might like to use in your own classroom at the QR code.



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## L'insécurité alimentaire: ça nous préoccupe?

### Food insecurity: do we care?

*Isabelle Schäfer is the PGCE secondary subject leader for modern languages at the University of Worcester and the School of Education Quality Coordinator. She has worked at the university since 2008 with additional responsibilities as a PGCE module lead and delivering the PGCE part of SCITT programme. Research interests include cross-curricular and cross-phase collaboration and the development of reading comprehension in modern languages.*

Three years ago, the Select Committee on Food, Poverty, Health and the Environment published a damning report on the state of food insecurity in Britain and deplored that in this day and age some people still have to go without food (2020, p.30). Nearly three years later, The Trussell Trust reveals that the situation has worsened further and that “between 1 April 2021 and 31 March 2022, food banks in The Trussell Trust’s UK wide network distributed over 2.1 million emergency food parcels to people in crisis. This is an increase of 14% compared to the same period in 2019/20” (The Trussell Trust, 2022, no page).

“In a series of phone calls, facilitated by Sustain and Church Action on Poverty, the secretariat spoke with individuals who have experienced food insecurity. Cath from Newcastle said: “When you are trying to make meals, you want to make a meal that is going to fill everybody and unfortunately that means you use repetitive

ingredients as well. So, for example, to buy frozen vegetable is a lot cheaper because you are getting quantity. So, if I can get three meals say out of buying a frozen bag of onion and peppers, what am I going to use? I’m going to use those packets three times in different meals.” “I don’t know anyone who doesn’t use what we call the yellow sticker aisle. We all do that. If you’re on a budget, you got to do that.” “You used to get your money fortnightly. That’s got to last two weeks. You need to make your bills, so your bills come out first, then your shopping. So you want that shopping to be as economical as possible, to last 14 days. In last few days, you may just have to eat once” (Select Committee on Food, Poverty, Health and the Environment, 2020, p.39).

***Ultimately, it is important to give pupils opportunities to engage with the issue of food insecurity in Britain and beyond “to deepen their understanding of the world” (Department for Education 2013 p.1) and to carry on developing the knowledge and the skills that they need as global citizens***

Who amongst us knows what Cath has experienced? To what extent can we empathise with Cath if we have not faced food insecurity ourselves? In their outline of a “nexus of denial” (2021, p.118) in the context of climate emergency, Bendell and Read suggest that we tend to favour individualism and “exceptionalism” (2021 p.136). In other words, food insecurity will never affect us; it only affects others. To counter those othering behaviours which are likely to breed indifference and dehumanization, Mezzenzana and Peluso argue that we can give some thoughts to what being “in another person’s shoes” (2023, p.5) might feel like, thus generating empathy. They warn however that the willingness to be empathetic, which might be ephemeral, is subject to gaining knowledge and understanding of the circumstances in which people find themselves. Examples and voices, such as Cath’s experience are powerful. In another genre, Bilston’s compelling poem Refugees (2016) shows how language can be used to convey feelings such as othering and empathy.



Using language as a means to an end and reflecting on food insecurity in modern language lessons is worth exploring, with the caveat that teaching should be adapted to meet pupils' levels of proficiency for example. One approach might be to give pupils the opportunity to read texts written in the target language and to answer questions in English. Not only can this help pupils develop a wider range of reading skills and answer inferential questions as well as comprehension questions (Degener and Berne 2017), but it can also strengthen the knowledge that they develop in citizenship lessons. To this end, PGCE Modern Languages students have created short texts in French and associated questions in English. Those texts can be read from the top to the bottom or from the bottom to the top and questions can prompt pupils to reflect on empathy and on othering.

Il suffit de travailler pour bien manger.  
C'est facile de dire:  
"Je n'ai pas assez d'argent!".

We just need to work to eat well.  
It is easy to say:  
"I don't have enough money!".

Emma Chaminade

Here are some additional tasks to explore poems:

- Classes could also be split in two halves and be given the othering or the empathetic version of the poem.
- Pupils could be asked to come up with titles for the poems.
- They could act out poems.
- If they are proficient, they may even create a three-line poem.
- They can be encouraged to reflect on reasons that cause food insecurity.

Those tasks can be preceded by, or supplemented with, facts or accounts published in English such as Cath's experience, for example, or abridged and adapted accounts in the target language to develop pupils' background knowledge. This is essential to answer inferential questions.

Here are two examples:

Le budget de Prescilla et de sa fille, après paiement du loyer et des factures :  
"Un peu plus de 280 euros par mois pour manger, vivre, s'habiller, se déplacer à deux » [...] Moins de

5 euros par jour et par personne pour faire deux repas" (Dell-Vedove 2021).

La faim en Haïti

"Le panier de produits alimentaires de base est hors de portée pour de nombreux Haïtiens. L'inflation atteint le taux effarant de 33 pour cent et le prix de l'essence a doublé" (Texier 2022).



Ultimately, it is important to give pupils opportunities to engage with the issue of food insecurity in Britain and beyond "to deepen their understanding of the world" (Department for Education 2013 p.1) and to carry on developing the knowledge and the skills that they need as global citizens. Our MFL trainees created some resources to do just that with their pupils. You can find them at the embedded QR code.



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## How sustainable is ceramics, and what can we do in schools to minimise our impact on the environment?

*Simon Huson is the subject lead for the Secondary PGCE Art and Design at the University of Worcester.*

Over the last ten years there has been a renewed interest in ceramics, following the Crafts Council's *Firing Up* initiative that "aimed to reinvigorate craft education in schools and to reignite students' creativity through ceramic craft" (Crafts Council, no date), and the first few series of *The Great Pottery Throw Down* (BBC2 and Channel 4), broadcast throughout the Covid pandemic lockdowns. This craft is seen as a wholesome, back to nature activity, creating timeless objects rather than using more contemporary, throwaway materials in an evening classes Tom and Barbara *Good Life* kind of way. But is this view realistic?

***Ceramics, with its often toxic metal glazes, use of non-renewable virgin materials and carbon heavy kiln firings, is ripe for a radical re-think (Crafts, 2020)***

The UN Sustainable Development Goals (United Nations, 2023) outline several aims that are directly related to ceramics practice: goal 7 - affordable and clean energy; goal 9 - industry, innovation and infrastructure; goal 12 - responsible consumption and production; goal 13 - climate action; goal 14 - life below water; and goal 15 - life on land. It is clear from this that those involved with ceramics need to consider the sustainability of their practice, so it is good to think about what this might look like. Nancy Selvage, a ceramicist and member of the National Council on Education for the Ceramic Arts (NCECA) suggests that "a definition of sustainability in ceramics is that it keeps atmospheric carbon dioxide below dangerous levels...conserves natural resources...does not pollute the environment" (Selvage, 2017).

This article will focus on three main areas of ceramics production: the extraction of materials and waste; energy use; and environmental impact, and what schools and colleges can do to make their ceramics practice more sustainable.



### Materials extraction and waste

The question of materials sustainability encourages different viewpoints: Selvage says that "clay is naturally replenished by the geological weathering of feldspar which makes up 60% of the earth's crust" (ibid.) so we don't have to worry about it running out, but Bloomfield says "in addition, the clays and glaze ingredients used are dug from the earth and are not renewable" (Bloomfield, 2020).

The statistics are concerning; the mining of china clay creates 9 tonnes of waste for every tonne of clay (Crafts, 2020); half the porcelain made in Jingdezhen, the Chinese centre of porcelain production, goes to waste, and porcelain won't be around forever (ibid.); "the extraction of minerals uses 7% of world's energy consumption" (Selvage, 2017); colouring minerals (glazes, stains, underglazes – copper, tin etc.) are limited in supply and will be depleted within 20-30 years – others, such as iron and cobalt, will only last a few generations and are unsustainable (ibid.).

Some colouring oxides such as cobalt are rare, difficult to mine and occur in areas of the world where unethical practices take place (Bloomfield, 2020).



The potter David Binns has discussed, on an NCECA podcast (Binns, 2017), how he has investigated alternative materials to try to reduce his impact on the Earth's resources and environment. He says that potters consume a lot of virgin materials and produce different kinds of waste, including

seconds, glaze slop waste, broken kiln furniture, kiln linings and so on; this may be true, but the Crafts Council suggests that studio potters only



use a fraction of the materials and energy of the ceramics industry (Bloomfield, 2020). Industry uses huge amounts of non-replenishable materials; for example, the sanitaryware ceramic industry produces 20% of the waste of the ceramic industry as a whole – a swimming pool worth of glaze waste is thrown away every week (Binns, 2017).

Binns says that new materials are in their infancy, but his practice has changed over the years, aiming to work with fewer virgin materials. At first, he began using no glaze, creating just pure



clay forms and sanding surfaces to reveal their texture, later developing his own aggregate materials (groggs – pre-fired clay pieces, broken up, and added to new clays), using stains to colour them, then grinding and polishing back the surfaces to reveal the added materials. He then moved on to using found materials from beaches and quarries, not yet concerned with sustainability. The next stage of Binns' development was to introduce glass into his



pieces, combining it with other materials in a sacrificial mould. Importantly, this led to no plastic clay being used, and an increase in the use of waste glass and waste aggregates. Working with a PhD student at the RCA led to the development of refractory concretes which in turn led to further research into the making of tables, tiles etc. through a UKRC project, developing value from low value waste. Binns now makes pieces without using any virgin materials.

A study in *Rewas 2016: Towards Materials Resource Sustainability* (Savazzini et al., 2016) researched how the incorporation of raw clay waste is an alternative to make the

structural ceramic sector more environmentally sustainable while reducing the consumption of clayey raw material. The Brazilian structural ceramic industry consumes 10.3 million tons of clay per month. The results show that the addition of waste improves the evaluated properties [such as porosity, density etc.]

significantly. With this, the reuse of raw clay waste in the clayey mass for production of ceramic roof tiles and blocks can contribute to the sustainability of ceramics sectors, reducing raw materials consumption and

avoiding waste disposal in landfills.

Some suggestions for how schools might develop their practice to reduce environmental impact come from a range of studio potters: Nancy Selvage (Selvage, 2017) suggests that if you want a sustainable practice, you must eliminate rare raw materials or purchase 100% of them from recycling or environmental clean-up operations, and you should get detailed materials data sheets so you know what you are using. You should also reuse materials where possible; Selvage's work uses pre-made ceramic shards. David Binns discusses making sure of local government policy relating to waste recycling and trying to make use of waste (DEFRA, 2021). Linda Bloomfield (Bloomfield, 2020) suggests rethinking your studio waste, reusing all unfired clay, recycling excess glaze, and avoiding using toxic glaze materials. University and college ceramics courses could collect waste products from schools to make things with, purchasing crushers for discarded fired ceramics.

Further examples of how artists have responded to the issue of sustainable materials are to be found in *Crafts* magazine (Crafts, 2020). Artists include Lotte Douwes, who grinds shards left over from making tableware into a fine powder and uses them to make slip for casting thereby reducing the use of new clay. The issue of fired ceramics going into landfill sites has been tackled by Liverpool's Granby Workshop who make 100% recycled tableware using local post-consumer and industrial ceramic, glass and stone waste. As students at the RCA, Studio ThusThat made a range of tableware, manufacturing with local factories, using the



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waste products from mining alumina. 150 million tonnes of 'red mud' waste is produced each year, which is very alkaline and hazardous to the environment. Agne Kucerenskaite, working between the Netherlands and Lithuania, has found alternative metal oxide sources for her glazes in the by-products from leather production, and the production of drinking water (10 tonnes of iron waste comes from providing one month's supply of drinking water for one town). Sinae Kim uses distilled urine to create glossy, opaque ceramic glazes. Finally, Yoon Seok-hyeon makes lacquered pots – there is no need to do a glaze firing, thus avoiding the use of rare glaze materials, and the pots can be recycled as grog later on.

### Energy

*Studio potters often worry about the large amount of energy needed to fire kilns to a high temperature to produce ceramics (Bloomfield, 2020), but, studio potters only use a fraction of the materials and energy of the ceramics industry (ibid.).*

Nancy Selvage (Selvage, 2017) discusses the range of fuels used to fire kilns. Natural gas, she says, is a relatively clean fuel, and it produces the least CO<sub>2</sub> of all fossil fuels, but it is not sustainable because it is a limited resource; fracking to find more is damaging and polluting the environment. Methane (captured natural gas) has the most beneficial impact since burning it is far better than it being released into the atmosphere where it is 20% better than CO<sub>2</sub> at trapping in heat. Wood fired kilns produce more CO<sub>2</sub> than other fuels, but they are sustainable if enough trees are planted to replace, and exceed, the ones used for fuel; trees absorb CO<sub>2</sub> and give back the same amount in burning. Wood has the potential to reduce emissions if enough is grown. Guido Strijbos (Strijbos, 2017) a kiln maker, tells us that 50% of gas converted into electrical energy is lost because gas turbines are inefficient, but the

use of hydro power would be a good alternative. Some options that are being promoted, and are useful for schools to consider, include: making unfired ceramics for sculpture (Selvage, 2017); ensuring the kiln is at full capacity before firing, avoiding gas kilns all together, switching to green energy providers for electric kilns [important for schools as most will use electric kilns], or switching to wood firing kilns using sustainably sourced wood (Booth, 2023). Some potters use the heat produced from their kilns to heat their homes to offset the impact or are using solar panels to power their kilns (ibid.). Linda Bloomfield (Bloomfield, 2020) supports the idea of using sustainable energy providers [I have used Bulb, now owned by Octopus, for years; 100% of their energy comes from renewable sources (Bulb, 2023)].

Guido Strijbos (Strijbos, 2017), of Blaauw products in the Netherlands, makes kilns and says that the firing of a kiln takes most energy in a potter's process: in gas kilns 50% goes out of the chimney, 10-15% into the kiln walls, 10-15% through the walls of the kiln, and a maximum of 30% goes into the ware. Similar consideration must be given to the use of electric kilns in schools. He suggests that current technology needs a cultural change. He questions whether or not we need to fire everything we make – do we need to fire to learn? Careful consideration of firing curves – faster firings and lower temperatures – might be beneficial, and you should explore what is possible, monitoring and record keeping (of firing curves) is essential to allow you to investigate; you can reduce energy consumption if you do this. Using natural cooling rather than down firing (where energy is used to control the rate of descent) is something that would benefit electric kiln users too. If you change your glaze recipes you can also speed up firings, using less energy. Kiln firing using alternative technology such as solar-powered kilns, or bicycle-powered (Aaron Nelson) are in their infancy. High pressure sintering, in which powdered clay is compressed at room temperature, is being explored by industry. Using local materials and firing to 1080 reduces impact on climate. Wood firing is 75-100% carbon neutral. Another example from Crafts (Crafts, 2020) is the potter Spandana Gopal, from the design studio Tiipoi. He makes low fired earthenware cookware that are burnished so no glaze or non-stick coatings are used. These will biodegrade and can be returned to the earth, as truly sustainable ceramics.



### Environmental impact

Nancy Selvage (Selvage, 2017) raises the question – do you think an industrially produced ceramic mug is more sustainable than paper, foam, or plastic? Actually, ceramics has more embodied energy due to its weight. Energy wise, ceramic breaks even with foam after 1000 uses, but never with plastic! Also, just like some plastics, glazed and fired clay will not biodegrade and cannot easily be reused (Crafts, 2020). Glazes can also include pollutants, including lead and barium (Bloomfield, 2020) which will seep into the environment around landfill sites.

### What are the solutions, and what can we do in our ceramics practice in schools and colleges?

Here are a few ideas: Selvage (Selvage, 2017) suggests washing brushes in containers, one per colour; decant, save and reuse materials; don't use particular contaminants such as vanadium, lead etc. and the environment will be safer- if you do, dispose of them properly, with no glaze materials down the sink; collect glaze sludge and dispose of it properly, not into the environment; this sludge may become valuable and you could be paid for it in the future! Tamra Booth, of Keeeps Pottery Store and Studios (Booth, 2023) suggests using biodegradable corn starch packing peanuts instead of plastic packaging such as bubble wrap; the potters that supply Keeeps only make a certain number of items and nothing is mass produced; all of their potters are based in the UK and *supporting local, home grown products reduces imported items, avoids unnecessary transport pollution, promotes British skills and craftsmanship and supports local economies.* Booth also suggests that potters should always recycle clay that is not used, particularly that which remains at the bottom of the slops bucket which can be recycled to limit wastage; any pots that don't meet exacting standards should also be recycled; and finally, Booth suggests that *if you have any broken ceramics that are of no use, simply take them to your local recycling centre. Here, they are often repurposed as gravel or crushed to be used in drainage and sewage systems or even made into different ceramics so do not end up in landfill!* (ibid.).

This edition of the UW Source magazine has a central theme of food, and there is a clear link between ceramics, food and sustainability.



*Chefs today believe that the plate you're eating from is almost as important as the food you're eating. Which is why more of them are turning to bespoke ceramics, using either plates and bowls that they have made themselves, or had commissioned by professional potters (Love, 2017). This may be because the ceramics can be designed specifically for that chef's food, or because they want something more individual:*

*[Restaurant] Nathan Outlaw discovered the Japanese-style pottery of Cornwall-based Chris Prindl when a photographer brought some pieces to a photo shoot. Nathan fell in love with them, and asked Chris to design him an entire dinner service. "It's lovely to know that no one else in the world has the same plates and bowls as us," says Nathan, adding that they're as important a part of the diner's experience as the food, the sea view and the artwork*

*on the walls (Hargreaves, 2019). Shannon Bartlett-Smith, of @pots\_and\_paper, is a potter based in Cornwall, who has recently been working with Porthminster Beach Café in St. Ives (@images this page). She says she loves "seeing my work being used and enjoyed especially in such a beautiful way" and watching the chefs*



*"doing their incredible thing and plating up the most amazing creations on plates made by me" (Bartlett-Smith, 2023). As we have seen previously studio potters have a much lower impact on the environment than mass produced industrial ceramics (Bloomfield, 2020), so this kind of collaboration must be a good thing all round! It's certainly an aspect of the creative industries that we can guide our pupils towards. As Lisa Hammond says "We've got to make the next generation aware of these issues, so they think about how they practice in the future" (Crafts, 2020).*



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## Closing remarks

We hope this edition has been engaging, enlightening and empowering, and has provided you with ideas and inspiration for your classroom, as well as connecting you more deeply with the global framework for sustainable development, the Sustainable Development Goals! We would love to know what you have trialled in your school and your thoughts on the articles and resources. You can feedback to us using the QR code embedded on this page.

We have taken some highlights from the articles to illustrate the importance of grappling with these issues with your students:

Ultimately, it is important to give pupils opportunities to engage with the issue of food insecurity in Britain and beyond “to deepen their understanding of the world” (Department for Education, 2013 p.1) and to carry on developing the knowledge and the skills that they need as global citizens. (taken from MFL article)

Psychological research has found that food insecure populations are significantly more susceptible to developing psychological disorders than food secure populations (Gyasi, Peprah & Appiah, 2020) (taken from Psychology article)

Making informed decisions about the food we eat and how we produce it will prevent damage to our planet (taken from D&T article).

Now you have read the article(s) what particular reason would you give for teaching about sustainability and food?

The International Panel of Experts on Sustainable Food Systems (IPES) report that climate change and conflict “are locking in persistently high levels of poverty and hunger” (IPES, 2022, p15), they are a serious risk to food supplies and being further exacerbated by rising living costs. The impacts of which we are seeing first hand in our communities.

Global Food Security research by Alexander et al (2022), suggests that food price rises will lead, globally, to diets becoming poorer, with up to 1 million additional deaths and 100 million more people becoming undernourished. It is becoming too expensive to eat well and the poorest in our communities are the most affected.

The UK Government, in their UK Food Security Report (2021), identify several risks to our long-term food security: climate change, climate

variability and biodiversity loss. They highlight these as the biggest medium- and long-term threat to our UK food production.

In a heavily loaded curriculum, which is competing for space, there is a demand on teachers to fix societal ills. More and more social responsibility is piled onto teachers. Teachers wear multiple hats, and it could possibly feel that sustainability is simply another hat to wear on our pressured heads. Mary Myatt challenges us in stating “We cannot just keep adding more and more to our work schedules, otherwise we will go under. But it takes bravery and discipline to ask ourselves, do we really need this?” (2023).

Do we? Myatt provides us with a useful measure when she suggests, “Our guiding principle for this work [helping us to decide what forms the curriculum] might be William Morris, who said that we should have nothing in our homes unless we know it to be useful or believe to be beautiful: when we place this idea within our work context we might ask ourselves whether the systems and the resources and the materials we are working with, really are useful?” (2023).

Creating a curriculum which has sustainability at its heart is useful, beautiful....and crucial. Students deserve to be educated for the future, and to secure the future. When we have record numbers of people, including in the UK, experiencing hunger we may wish this to be imaginary but as the English article reminds us “Although both Dickens and Loach’s works are fictional, both act as representations for the ongoing difficulties many people across our country face in their daily struggle with food insecurity.” It is not just empty bellies that might be the problem but “The effects of food insecurity on our pupils are varied, from poorer academic performance and anxiety, as well as school absence and other physical and behavioural issues”.

This publication may be a modest start, but we hope the articles and resources for your use in the classroom will provide food for thought (pun entirely intended) in educating your students to thrive in the coming years. Please let us know your thoughts and responses to these. Giving the last words to Myatt (2023): “When we release ourselves from some of the things that are getting in the way of cracking on with our best work, work which has impact, it is liberating”.

The PGCE Secondary and FES team

2 ZERO HUNGER

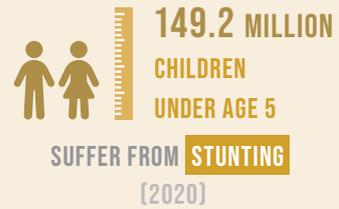
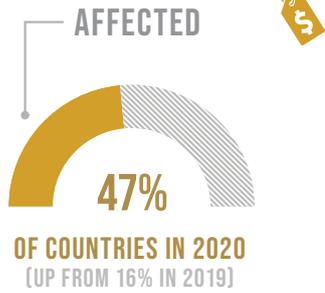


# END HUNGER, ACHIEVE FOOD SECURITY AND IMPROVED NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE

**CONFLICT, COVID-19, CLIMATE CHANGE AND GROWING INEQUALITIES ARE CONVERGING TO UNDERMINE FOOD SECURITY WORLDWIDE**



## SOARING FOOD PRICES



**TO REDUCE STUNTING IN CHILDREN BY 50% BY 2030, ANNUAL RATE OF DECLINE MUST DOUBLE (FROM 2.1 TO 3.9% PER YEAR)**

## UKRAINE CRISIS TRIGGERED FOOD SHORTAGES FOR THE WORLD'S POOREST PEOPLE

**UKRAINE AND THE RUSSIAN FEDERATION SUPPLY GLOBAL EXPORTS:**

