

# Sustainability education: should it be an entitlement for all pupils?

## *An EiS supplement*

## Introduction

The November 2018 issue of Education in Science included a six-page feature of sustainability and sustainability education, written by a range of experts in the field, education practitioners and environmental organisations.

These articles looked at what effective 'environmental' and 'sustainability' education looks like and how they link to best practice STEM education. Several more articles were offered and we decided to include them as an online supplement to the special issue of EiS.

We are sure that you will find these additional articles helpful, inspirational and informative!

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# Science Education and the UN Sustainable Development Goals

■ Elena Lengthorn, Senior Lecturer in Teacher Education, University of Worcester

On 25th September 2015, world leaders met at the United Nations (UN) Headquarters in New York to adopt a set of ambitious development goals at an historic UN summit.

The agenda of the Sustainable Development Goals (SDGs), also known as the Global Goals, was agreed by 193 countries and aimed to end poverty, hunger and inequality, take action on climate change and the environment, as well as improving access to health and education, and more. The SDGs are the direct descendants of the anti-poverty

Millennium Development Goals (MDGs), the goals that were adopted in 2000 and ran until 2015, under which significant progress was made, with regional averages showing improvements towards the goals in many areas (United Nations (a), 2015). However, a number of regions also showed poor progress, or even a deterioration, in relation to some of the anti-poverty goals, e.g. *Ensuring Environmental Sustainability*.

The SDGs, adopted three years ago for delivery by 2030, consist of an increased number of goals, up from just eight MDGs to seventeen, within which there are 169 targets. What is our responsibility, as educators, in delivering these bold objectives? Education is a key thread that supports

progress in many of the targets, but there is also a specific aim for education: Goal 4 – *Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*.

Within this goal there are 10 targets, from equal access to education to goals for literacy and numeracy. The goal that I am passionate about bringing to your attention is target 4.7:

*'By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and*

## Key questions

- What are the United Nations Sustainable Development Goals?
- What is our responsibility, as educators, to deliver on these goals?
- How can we build Education for Sustainable Development (ESD) into our science teaching?



non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development' (United Nations (b), 2015).

Yet there is no mention of sustainability in our existing statutory science curriculum. There are 33 mentions of the environment (in relation to exploring and connecting with the local environment and scientific process/ concepts) and just one mention of renewable and non-renewable energy at Key Stage 4 (ages 14-16). There is also no requirement in the English teaching standards (DfE, 2013) to teach for or about sustainability, unlike in Scotland where 'Learning for Sustainability' is embedded in the standards for registration and career-long professional learning, as well as in the standards for leadership and management.

That's not to say that we cannot or should not find ways to build education

## Learning for Sustainability

*'Learning for Sustainability is a whole school commitment that helps the school and its wider community develop the knowledge, skills, attitudes, values and practices needed to take decisions that are compatible with a sustainable future in a just and equitable world. Learning for Sustainability has been embedded within the Standards for Registration to support teachers in actively embracing and promoting principles and practices of sustainability in all aspects of their work' (GTC Scotland, 2012 p.2).*

for sustainable development into our classroom practice. Indeed, we have a responsibility to future generations to do so. The latest Intergovernmental Panel on Climate Change (IPCC) report, compiled by the world's leading climate scientists and released on 8th October 2018, was described by the UN Chief, Antonio Guterres, as 'an ear-splitting wake-up call to the world. It confirms that climate change is running faster than we are – and we are running out of time' (United Nations, 2018).

It has also been recognised that it is the right of young people, under the United

Nations Convention on the Human Rights of the Child (UN, 1990) as part of article 24: directing the education of the child in the "development of respect for the natural environment" (UN, 1990 p.9), to have education for sustainable development. Links have also been made between Goal 4 and additional rights by the Danish Institute for Human Rights (DIHR, 2015).

What are schools doing about the sustainable development goals? Some schools have taken the SDGs into their own hands (and curricula) and have been delivering lessons that include education and action for the Global Goals: from one-off workshops, to environment days, to embedding education for sustainable development at the core of school values.

## If you are feeling inspired...

There are some wonderful resources for driving education for sustainable development into your science lessons:

### Eco-Schools

This international programme encourages schools to use its student-led framework to embed a sustainability approach into school life across campus, curriculum and community. Its website includes helpful science curriculum-linked examples of activities, as well as case studies from schools on a variety of topics including transport, litter, waste, energy and biodiversity. You can find them here: [bit.ly/eco2sch](http://bit.ly/eco2sch)

## Case study 1

### Christopher Whitehead Language College – Annual Environment Day:

Despite the ongoing pressures on curriculum time, this environmentally-minded school dedicates an entire day for Year 8 (age 13) pupils to connect with the curriculum through the environment, working with local teacher trainees to deliver a carousel of environment-based activities, from biodiversity to water consumption.



Case Study 1. The team of trainee teachers who planned and delivered an Environment Day focused on the UN SDGs.



## Case study 2

**Northwick Manor Primary School:** This primary school in the West Midlands introduced its Year 6 (age 11) students to the SDGs by using the World's Largest Lesson resources and a series of practical science workshops, making fuel-efficient stoves from clay and water bottle light bulbs from the Litre of Light. The Litre of Light (pictured right) is an open source design for a low-cost light tube, which refracts solar light to provide daytime interior lighting. Pupils made their own from recycled pop bottles and implanted them in cardboard boxes to see the refraction effect.



Case Study 2. Northwick Manor Primary School, Year 6 pupils, with a giant inflatable Earth Balloon at the start of their 'Science and the SDGs' Day.

## World's Largest Lesson

This useful website introduces the sustainable development goals to children and young people everywhere and unites them in action. They produce free and creative resources for educators to teach lessons for and about the Global Goals, including Aardman animated films, written by Sir Ken Robinson and introduced by recognised figures such as Malala Yousafzai, Emma Watson and Neymar Jr. The resources are available under a non-commercial creative commons licence and they encourage you to share widely! They can be found here: [worldslargestlesson.globalgoals.org/](http://worldslargestlesson.globalgoals.org/)

## Global community

There is a whole community of global educators dedicated to responding to a call to action within education to deliver on the SDGs, sharing resources and projects allied to the Global Goals.

Sign the pledge to join them, by adding education and action for the SDGs to your lessons, here:

[www.teachsdgs.org/join.html](http://www.teachsdgs.org/join.html)

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# Education holds the key...

■ Peter Milne, Founder/Director of Target4Green [peter@target4green.com](mailto:peter@target4green.com)

*'There's no sugarcoating it: keeping warming to 1.5 °C will be hard. Really hard. But the IPCC report also makes it clear that the world has the scientific understanding, technological capacity and financial means to tackle climate change. Now what we need is the political will to precipitate the unprecedented concerted actions necessary to stabilize temperature rise below 1.5 C'*

This is an extract from an article by the World Resources Institute about the recent Intergovernmental Panel on Climate Change (IPCC) report.

With political will should also come the recognition of just how important a role education plays in all of this, with

whole school community engagement and curriculum support critical to its success. Climate change is not simply something to be 'aware' of; it must be tackled through greater understanding and motivation to act.

## Moving forward with ESD

Introducing an Education for Sustainable Development (ESD) programme in a school is not always easy. This article sets out the crucial steps necessary for success:

### The aim

The basic aim of 'Education for Sustainable Development' is to nurture an individual who is able to solve environmental challenges facing the world and promote the formation of a sustainable society.

### ESD in schools

The first challenge is to have an ethos in schools that openly and enthusiastically supports the implementation of ESD. This is partly

down to the curriculum that the school follows, but is mainly as a result of the interest and effort shown by senior management in promoting integration and whole school engagement, with teacher training a critical element. Building a sustainability curriculum is also down to the expectations that are put upon schools by education authorities.

With trained and motivated teachers, it is far easier to inspire and motivate students. Teachers can often use the environment as a vehicle for teaching certain concepts in their own specific subject and, once teachers have decided that this is worthwhile, they will increasingly find ways to use ESD ideas in their work.

Using environmental issues in student learning shows students the bigger picture, which can significantly improve motivation. By letting pupils know why the work they are completing is important, and showing them where it fits in on a local and global scale, you're enabling them to see its value.







## The last word...

Dr. Jennie Mallela from the Research Schools of Biology and Earth Sciences at the Australian National University wrote:

***'I believe people are capable of amazing things and I do believe that climate change can be halted and even reversed. I just hope it happens in my lifetime. I don't want to become the generation that future children talk of as having destroyed the planet. I'd like to be the generation that fought back (and won) against human-induced climate change; the generation that worked out how to live in harmony with the planet – that generation!'***

### Further challenges within schools

Schools are busy places and there are increasing pressures on teachers within the workplace. These can create additional challenges, such as gaps between awareness and understanding, motivation to and knowledge of how to become more sustainable. The process requires a movement from individual to collective empowerment, finding time, overcoming budget restraints, linking infrastructure change to mindset change and whole community engagement.

However, with a more directed focus and commitment towards ESD in schools, children generally need very little motivation to care for their environment. You just have to give them a voice and they are away! Having motivated and engaged teachers really helps though and science education can play a critical role:

The goal of science education is not knowledge of a body of facts and theories but a progression towards key ideas that enable understanding of events and phenomena of relevance to students' lives.

### Strategy for promoting change

The change needed to implement ESD effectively can be broken down into three elements:

- The need for physical change: looking at how schools, households and businesses can reduce their waste, water and energy and focus on more sustainable resources in general;
- The mindset change: this is all about raising environmental understanding, awareness and action programmes throughout the school and business communities, through workshops, cross-curricular activities and presentations, so that everybody is on the 'same page', as well as giving students and employees a voice. This leads to a fundamental change in attitudes and the choices people make; and
- Learning to respect others and appreciate the environment, as well as giving back to society: this is focused around the opportunities to learn beyond the workplace and home and connect to nature, as well as helping communities in need. In a nutshell, it is about being more caring.

### Climate change: from causes and consequences to rights and responsibilities

Target4Green has developed an in-school programme that takes a practical and impassioned look at the why and how of climate change, linking these with the critical role of education, basic human rights, global citizenship and the UN's Sustainable Development Goals.

Flexible in its approach, the programme is being offered as an assembly/ student council 2-hour session, a half day to include student assemblies and workshops, or a full day that would incorporate a parent workshop and staff CPD as well as an evaluation of current practice. For more information, please contact Peter Milne, Founder/Director, at [peter@target4green.com](mailto:peter@target4green.com)

# A whole school approach to sustainability activities

■ Ann Finlayson is Executive Chair, SEEd, FRSA [ann.finlayson@se-ed.org.uk](mailto:ann.finlayson@se-ed.org.uk)

Want to make the most of your activities for the environment, sustainability and global citizenship? A whole school approach to sustainability is your answer!

I have had numerous discussions with teachers and Headteachers in the last 10 years and there is a real concern about repeating sustainability activities; not making the most of the potential for learning; and not seeing a progression of knowledge, skills and attitudes upon which they can report.

Again, a common theme is the isolation of the 'champion', but our work with schools using an appreciative inquiry method has shown that there is an untapped awareness, and motivation, in schools, but often not a mandate.

Education for Sustainable Development (ESD) began in the UK in the late 1980s with WWF-UK, who began by developing pockets of practice, then adopting a whole school approach. In 2002, this became a framework called 'Pathways'. The UK Department of Education then adopted this whole school approach in 2004, leading to the UK Sustainable Schools Initiative. A framework with an ethic of 'care' – care for oneself, care for others (local and global) and care for the environment – was developed to be embedded in school improvement plans.

## What is a whole school approach to sustainability?

A quick Google search will reveal a plethora of approaches to the concept of whole school interventions. They can be categorised into two main approaches:

- whole school engagement on a topic or practice; and
- whole school approaches categorised by an ethos/vision and a framework.

The first approach is much more about engagement. For example, the RSA is currently promoting a whole school approach to the mental health of pupils. By this, they mean that all staff are trained and responsible for monitoring and helping – it's not just left up to one counsellor. However, a whole school approach to sustainability is built on an ethos and a self-evaluating framework so that the work can continue to develop.

## Why is an ethos and framework essential?

Firstly, you will be modelling to the students all the ways in which sustainability can be investigated: campus, curriculum and community and in an integrated way.

1. You will be modelling how it relates to all our knowledge and how the world works – environmentally, economically and socially. There are many opportunities within the current National Curriculum to do this. The original framework used 'doorways' to access sustainability thinking, e.g. food, water, energy, inclusion, buildings, transport, etc.
2. Secondly, you will be working with a topic that not only motivates students, but also really concerns them. Many surveys have shown that this worry about the future exists within young people and is one of the contributors to declining mental health in that group.
3. Thirdly, you will be doing your own action research and

learning, which you could be encouraging your students to do as well. This is important, because living and working sustainably is a developing practice, in terms of our changing environment, changing technology and changes in society. So it is important that students learn this key concept about sustainability.

There is no one way to teach sustainability – and the textbook on how to solve all our problems has not yet been written. There are, however, 17 Global Goals, called the UN Sustainable Development Goals, and all governments have signed up to them. We have until 2030!

4. Fourthly, you will be able to move from assemblies about climate change, switching off lights campaigns or campaigns to reduce plastic, to genuinely trying to embed actions in the school.

The learning from this will provide an ever-changing set of projects, year on year, which build skills and knowledge for students.

5. Fifthly, by using a framework, you be able to track and report on student achievements from this approach.

6. And lastly, the evidence shows that schools are more likely to sustain this work if they develop a whole school approach.

If you would like to learn more about how to develop this programme for your school, please visit the SEEd website at [bit.ly/se-edsch](http://bit.ly/se-edsch)

# Finding opportunities for environmental education in the curriculum

■ Juliette Green - Writer, teacher and environmental educator



## Professor William Scott, Chair of Trustees, NAEE (UK)

**'It is clear that environmental education has a key role in helping us address the challenge we all now face: how can we all live well, without compromising the planet's continuing ability to enable us all to live well? We do not yet know enough about how to do this, and so we must learn our way into it. I welcome this handbook as a contribution to this great task'**

When the National Curriculum for England and Wales was streamlined in 2014, I was tasked by the National Association for Environmental Education UK (NAEE) to compile a handbook – *The Environmental Curriculum* – highlighting the opportunities for environmental education in the curricula for the Early Years Foundation Stage and Key Stages 1 & 2 (ages 3-11).

As a primary-trained teacher with plenty of experience delivering curriculum-linked activities for pupils outdoors, I was able to draw on my own practice and pick up a whole raft of additional ideas.

The follow-up document, which focused on opportunities in Key Stages 3 & 4 (ages 11-16), proved more of a challenge, as it required a good deal more research, but I found it to be a very thought-provoking and stimulating experience.

The handbooks provide ideas for activities both inside and outside the classroom, and cover the three interrelated components of environmental education:

- Education ABOUT the environment: Developing knowledge and understanding about the environment, both local and global, taught mainly

through the subjects of the sciences, geography, history and design & technology.

- Education IN the environment: This can be thought of as the 'hands-on' element, i.e. using students' immediate surroundings and the wider world as a learning resource, which helps to develop a range of (cross-curricular) skills. For example: communication skills (via spoken and written language, drama, art, music etc.), mathematical skills, study skills, problem-solving, personal and social skills, and information technology skills.





Key Stage 2 pupils carrying out soil sampling activities. Image credit: Nigel Attwood



Reception pupils learning about plants through small-world play linked to a storybook (Jasper's Beanstalk by Nick Butterworth and Mick Inkpen). Image credit: Ann McCulloch



Secondary students carrying out invertebrate sampling to assess water quality. Image credit: Kirstin Bunting



The sustainably-built 'world classroom' at Nunnery Wood High School. Image credit: Elena Lengthorn.

• Education FOR the environment: The development of positive attitudes and behaviours towards the environment. This aspect can only really be effective if the other two elements are in place, as students need to be able to understand, recognise and value the environment in order to want to safeguard it for the future.

Each document begins with a brief history of environmental education: from the original coining of the term in the 1960s; through its status as a 'cross-curricular theme' (alongside health education, education for citizenship, careers and guidance, and economic and industrial understanding) in the 1990s; and the government's *Sustainable Schools Strategy* (2006-2010), *Learning Outside the Classroom Manifesto* (2006) and *Global Dimension and Sustainable Development* (in the 2008 secondary national curriculum). The handbooks then suggest opportunities for environmental education and ESD through the different key stages and curriculum subjects of the current

National Curriculum. Even in schools and academies that do not follow the National Curriculum, the ideas contained within the handbooks are still valid.

The sections on science and other STEM subjects (design & technology and mathematics) will likely be of the most interest to ASE members, as will the case studies of how schools have incorporated environmental education into their curriculum teaching and whole-school ethos.

Copies of NAEF's *The Environmental Curriculum* handbooks can be downloaded from the NAEF website at [naee.org.uk/latest-report-from-naee](http://naee.org.uk/latest-report-from-naee)

Juliette Green is a writer, teacher and environmental educator. She has written extensively about outdoor learning, science and English. Juliette is a volunteer member of NAEF's Executive, where she works on the journal *Environmental Education* and is part of the school bursary team.

The National Association for Environmental Education (UK) is an independent charitable organisation that supports and promotes teaching and learning about the environment in the formal education sector. The object of NAEF is to provide a public benefit by advancing environmental education within early years settings, primary and secondary schools, and institutions responsible for teacher education within the UK and elsewhere, in particular but without limitation by:

- facilitating curriculum development through the provision of resources, information and ideas for teachers;
- providing financial support for pupils to visit outdoor education centres; and
- collaborating with organisations that have related objectives.

For more information about NAEF, or to become a member, visit our website at [naee.org.uk](http://naee.org.uk)

# NUS surveys 60,000 students on sustainability in education

Over the last eight years, NUS has surveyed 60,000 students about their attitudes towards learning for sustainable development. From this it is clear that students care about sustainability and want to see it incorporated into their learning experiences.

- Approximately 80% of students want their institution to be doing more on sustainable development; and
- Around 60% of students want to learn more about sustainability.

This research has been repeated annually and the results have remained consistent, despite changes such as the rise in fees and the crash of the jobs market. The demand from students for action by their institutions and desire to learn about sustainability has remained constant.

From 2010/11 to 2015/16, the research was funded by the Higher Education Academy (now Advance HE) and was focused on students in higher education across the UK. Since 2015/16, the survey has included students in further education (FE). We found that FE students agreed with those in HE – that sustainability is important both during their time in education and beyond into employment.

Research like this has been integral to building the case for sustainability efforts by NUS across FE and HE in the UK. In 2018, this survey was replicated for the first time internationally. This was intended to find out if students studying at universities around the



world felt the same as those studying in the UK. NUS partnered with a number of international organisations to run an online survey, with 3247 students from around the world responding. See Figure 1 for the headline findings.

**The full report can be found at [bit.ly/2PD1yCE](https://bit.ly/2PD1yCE)**

As a result of this overwhelming demand from students in the UK and internationally, the question has been raised: what about students' expectations prior to starting college or university? To answer this, NUS has partnered with the Green Schools Project to start a longitudinal pupils' survey on sustainability.

The survey has just launched and schools are being asked to get their pupils to complete the survey, most likely as part of an IT lesson. It is for Years 5-13 (the last two of primary, all of secondary and 6th form), and there are some great cash prizes

that schools can win for sustainability projects. Not only that, but, if they get 50 or more responses, they will also receive a bespoke report presenting their data to them so that they can learn what their own pupils think about sustainability at their school. The survey will be open until Christmas 2018. We will produce a national report in spring 2019, which hopefully will make the case for more sustainability in schools. The survey is for all the UK and a Welsh language version is an option available from the first page of the survey.

All the information on how to take part can be found at [sustainability.nus.org.uk/resources/schools-survey-information-note](https://sustainability.nus.org.uk/resources/schools-survey-information-note)

**nus**  
national union of students



**91%** say they agree their place of study should actively incorporate and promote sustainable development

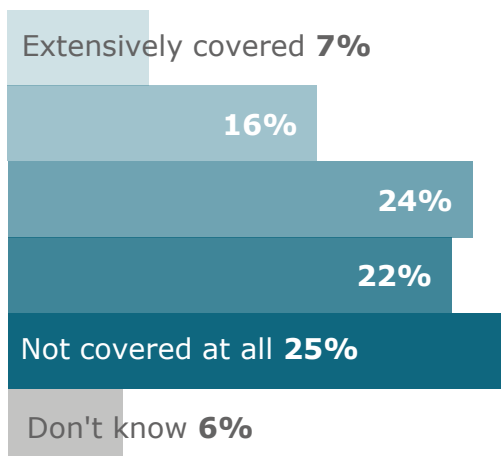


**70%** would like to see sustainable development actively incorporated and promoted through all courses



**81%** say sustainable development is something they would like to learn more about

**25%** say sustainable development has not been covered at all by their course



Governments from across the world should do whatever it takes to address climate change

**93%**

I am concerned about the effects of climate change

**92%**

I would vote for a Government that increased action to tackle climate change

**85%**

Climate change will negatively affect me and my lifestyle

**76%**



**61%** would accept a salary 15% lower than average to work in a job that contributes to positive social and environmental change



**25%** say they've never heard of the UN Sustainable Development Goals

**17%** rate their university as 'very good' in relation to the action it takes to limit the negative impact it has on the environment and society

Figure 1. From *Student perceptions of sustainability in higher education - An international survey*, NUS 2018 [bit.ly/2PD1yCE](https://bit.ly/2PD1yCE)



# Solving the problem with plastic

■ Practical Action

FEATURE

ONLINE SUPPLEMENT



Child waste picker in Nepal

We all know that plastic is becoming a huge global problem. Whilst plastic products are a part of our everyday lives, more must be done to reduce the amount of plastic we produce in the first place, then ensure what we produce is reused or recycled, minimising both production and consumption.

There are many complex issues around plastics and the negative impact on the environment, which are important for pupils to both understand and develop a sense of agency around. The problem about plastics is strongly linked to the Sustainable Development Goals (SDGs), particularly SDG 12: *Responsible consumption and production*.

One of the goals for this SDG is:

*'By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.'*

## The Plastics Challenge

At Practical Action, we have produced a set of teaching materials to help pupils aged 9-14 to understand the science of plastics, the environmental impact of plastics and what action they can take to make a difference. From a starting point of plastic waste in the UK, the global issue around plastics is introduced through the eyes of children in Nepal who collect plastic waste to sell to scrap dealers.

## Why is disposal such a big problem?

In the waste timeline activity, pupils look at the particular problem of disposal of plastics by looking at the time it takes for a number of items to decompose.



Practical Action's Plastic Challenge



## Life Cycle Analysis

One way to help pupils understand the complexity of making a plastic product sustainable is to introduce them to Life Cycle Analysis, where they look at plastics from production through to disposal, and suggest how to improve the sustainability of the whole process using the 4 Rs: Reduce, Recycle, Reuse, Rethink.



**PRACTICAL ACTION**  
Technology challenging poverty



## Are bioplastics the answer?

Pupils make bioplastics, then research and debate the issues around replacing plastics with biodegradable plastics and bioplastics, including the link to the biofuels debate.

## Plastics into profit

The main part of the challenge is for pupils to design and make a product either by recycling or reusing plastic. This links well to enterprise, and several schools have used the challenge to produce products such as coasters and bags that pupils go on to sell. The image (bottom right) below shows products designed and produced by pupils at Culloden Academy.



## A teacher's perspective

'I really liked that the plastics challenge helped pupils understand the global impact of plastics and what they can do to reduce plastic waste. The wider achievement course in S2 this year has been structured round the Sustainable Development Goals; the plastics challenge was perfect as a project work for SDG14: Life below water and SDG 12: Responsible consumption and production.

'The students will write up their plastics challenge to apply for a Discovery CREST award.

'After trialling four of the Practical Action STEM Challenges in Wider Achievement this year, the plan is to embed the Plastics Challenge, along with the other Practical Action STEM Challenges, into the BGE science curriculum for S1 or S2.'

*Katie Hudson, Biology Teacher, Culloden Academy*

*Images: (Top) Pupils at Culloden Academy making bioplastics (Bottom) Pupils at Culloden Academy with their birdbath and feeder made from reused plastic materials*

Go to [www.practicalaction.org/plastics-challenge](http://www.practicalaction.org/plastics-challenge) to download free materials, which include PowerPoint, teachers' notes, pupil worksheets, and more. E-mail [schools@practicalaction.org.uk](mailto:schools@practicalaction.org.uk) to request a free poster, which supports the challenge.

For more materials on the Sustainable Development Goals from Practical Action, please go to [www.practicalaction.org/global-goals](http://www.practicalaction.org/global-goals)

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