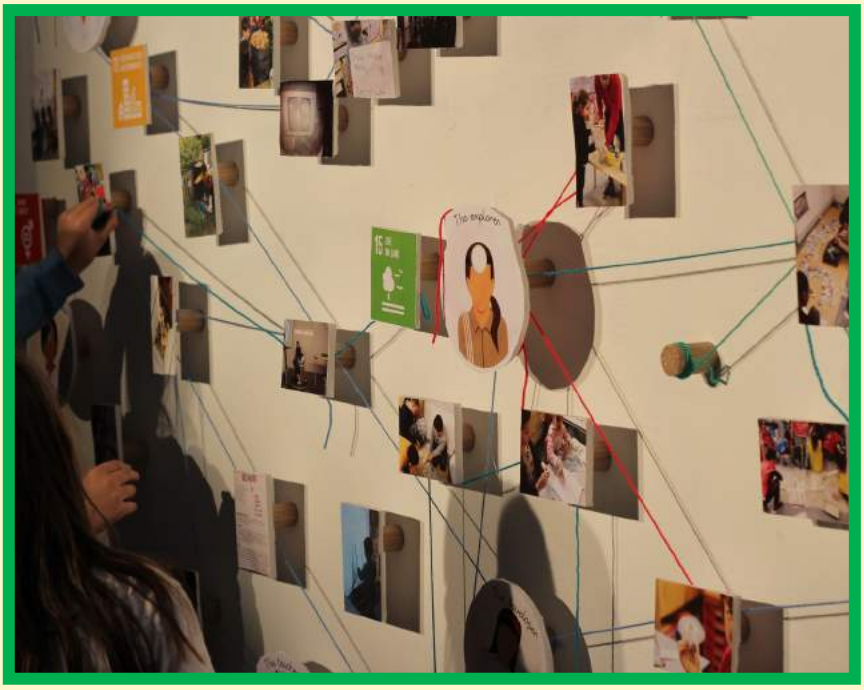
Environmental Education & the Sustainable Development Goals



Exploring curriculum opportunities in primary and secondary schools

NAEE
NATIONAL ASSOCIATION FOR ENVIRONMENTAL EDUCATION (UK)

Charity (CIO) number 1166502

Editor's Preface

This publication draws on articles from NAEE's *Environmental Education* journal* (Volume 120 Spring 2019), which focused on environmental education and the Sustainable Development Goals. It contains contributions from schools, universities and NGOs.

It begins with an analysis of where the goals (and global citizenship education more generally) fit into the current curriculum. There follows an overview of the very fruitful discussions that took place during NAEE's workshops at the Association for Science Education (ASE)'s annual conference; where teachers, teacher trainers, environmental educators and curriculum developers from the UK and abroad looked at links between environmental education, the SDGs and the curriculum.

There are then two case studies from schools, which outline the range of ways that they approach the goals and how students are leading change. The next article is about a pan-European Urban Science project that links urban science and the goals through outdoor inquiry-based learning. This is followed by an exploration of how the NGO Froglife uses outdoor learning to work with young people and adults on a variety of goals. There is then a short 'thinkpiece' which focus on the importance of environmental education to the goals.

The aim of the publication is to highlight the work that is currently going on in, and with, schools related to the Sustainable Development Goals, in order to provide teachers and educators with prompts for engaging young people in learning about local and global environmental issues.

Juliette Green Co-editor, NAEE *Environmental Education* journal

From UN communication materials website: tinyurl.com/ybhwqztm

* NAEE's journal — *Environmental Education* — is aimed at practitioners and policy-makers. It is published three times a year and carries reports on many kinds of environmental education, and offers insights into the Association's work with schools and NGOs. It is free to members. One edition is published as a hard copy; two as e-journal PDFs.

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Cover image: Children making connections between the SDGs and their learning. Image: Torriano Primary School.

The National Association for Environmental Education (UK) [Charity number 1166502] is an independent charitable organisation that supports and promotes teaching and learning about the environment in the formal education sector.

The object of NAEE 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
- collaborating with organisations that have related objectives

For more information about NAEE, or to become a member, visit our website.

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Introduction

2015 saw the Paris Agreement on climate change and the launch of the Sustainable Development Goals (SDGs), *aka* the Global Goals. The focus of the goals is transforming people's lives. They follow on from the reasonably successful, but less extensive, Millennium Development Goals.

The 17 goals apply to everyone in the world and cover our most pressing issues, for example: poverty, hunger, equality, energy, clean water and sanitation, biodiversity, climate change, economic growth, sustainable cities, and responsible consumption; as well as strategies such as education and justice.

The UK has signed up to support their implementation and this will require action to [i] realise the goals for all UK citizens, [ii] ensure that domestic action has a positive global impact, and [iii] support the delivery of the SDGs through DfID's (Department for International Development) work in priority action countries.

Although economic growth, international aid and development-focused trade will play the main role in realising the goals, it is obvious that education will have a key role, and a disproportionally important one in economically-developed countries such as the UK. Here, goal-related learning by students can help increase the likelihood that the goals will be valued, supported and hence realized, and a critical study of the goals in schools can enhance the focus, and help raise the quality, of student learning.

Every UK school now has an opportunity for its teaching and wider activities to cover a range of the goals, and, working in partnership with community groups, has the capability to bring teachers, students, leaders and external agencies together. Many such groups are also active in their own right, working with young people and others in community settings to help raise awareness and understanding of the goals and to bring about change.

Although there is a temptation to see school-age young people as merely preparing for further study, they are already consumers and citizens who make ethical and other judgements on a daily basis, and who have beliefs and values. There is, therefore, a responsibility on those working with young people to ensure they are helped to contribute to a more just and sustainable future.

A St George's House consultation in 2017 argued that for the goals to be successful, citizens, including young ones, should be provided with:

- participatory, creative and transformative learning experiences which enable them to understand the challenges, complexities, injustices and inter-dependencies of our world
- the opportunity to explore and understand the opportunities, connections, common aspirations and common humanity within our world
- an education which provides them with the opportunity to develop the essential skills, attitudes and dispositions that will enable and empower them as active citizens contributing to the achievement of the goals, and thus a fair and sustainable world, through their own choices and actions.

The goals and their associated targets are obviously not perfect, and some feel they do not go far enough to address the root causes of our global problems. Others argue that the 17 goals are not equally important and that the world needs to prioritise on those areas which will have the most impact. Both these points reinforce the need to help young people acquire the skills to think critically about the goals themselves and to understand how to influence and effect change locally, nationally and globally.

The interests of environmental educators in all these are clear. But the goals offer schools and NGOs a means of bridging the divide between environmental issues and social justice matters – across science and the humanities.

This handbook provides ideas for seizing the opportunities that present themselves to focus on the goals during formal and informal education, working across ideas and disciplines where sensible, and with appropriate partners whenever possible.

Professor William Scott Chair of Trustees, National Association of Environmental Education (UK)

Embedding the SDGs in the curriculum

Before the Sustainable Development Goals were agreed by the United Nations, a report (Bourn et al, 2016)[1] on the importance and relevance of Global Citizenship Education (GCE) and sustainability within the primary curriculum, included these statements:

*'**Sustainability:** Embed sustainability and global citizenship in educational policy and practice, linking to the UN Agenda for Global Education after 2015.'*

*'**Curriculum:** Develop a broad, balanced and rich entitlement curriculum which responds to both national and local need, eliminates the damaging division of status and quality between core and non-core, and teaches every subject, domain or aspect to the highest possible standard.'*

Whilst there is government support for this approach in Scotland, Wales and Northern Ireland through statutory curricula, this is not the case in England. As a consequence, the inclusion of GCE, sustainability and the goals is at the discretion of individual schools. The challenge, therefore, when teachers in England are under such intense pressure at primary and secondary level to achieve high-stakes results, is to convince school leaders and teachers that GCE, sustainability and the goals are critical components of a 21st century curriculum. To this end, it is essential to provide straightforward and easy-to-access guidance which can be used to enhance what *has* to be taught in the statutory curriculum. This article sets out how opportunities already exist for integrating the goals into current statutory programmes, and how these will enhance and make relevant test-driven lessons, allowing for learning, and discussion of, in -the-moment issues.

As pupils of all ages are '*growing up in a world of global media, in which the voices of many cultures compete for attention'* (De Block and Buckingham, 2007)[2], it is vital that teachers equip pupils to critically manage, assess and understand this deluge of information. As there is almost no spare capacity within existing timetables, this must, in the main, be addressed through existing subject disciplines. In their report on GCE in Europe, Tarozzi and Inguaggiato (2016)[3] show the crucial role of teachers:

'The opportunities available are, to some extent, implicit within the curriculum, rather than explicit in the form of either being statutory or recommendatory. This means that the inclusion of global issues within the curriculum relies heavily on individual teachers to champion and drive forward global issues.'

As an illustration, in a Geographical Association article[4], an NQT writes about work with her Year 6 class:

'If we accept that what we do as educators is to prepare pupils for the future, to become socially active and engaged in all aspects of the community, then there would appear to be a deficiency in our current curriculum. It does not provide opportunities for pupils to think prudently about the future and their role in it. However, enabling pupils to explore what might happen in the future can help them think for themselves. They can then evaluate the world around them.'

(Rose Erikson, Primary Geography, summer 2017)

Six essential elements of the SDGs.
Image: tinyurl.com/ycosljyo

Where do the opportunities exist in current statutory programmes at primary & secondary level?

As the recent NAEE curriculum guides[5] have illustrated, there is tremendous scope for developing concepts, ideas, knowledge, skills, values and attitudes that relate directly to environmental and similar issues, and have potential to provide a starting point for linking to, and exploring, the SDGs.

As teachers are familiar with their subject programmes of study, the challenge is to help them see the opportunities for inclusion of GCE and SDGs within their teaching. Pupils can then be exposed to the challenging issues of the day and begin to see the relevance and importance of the goals to them. An extract[6] from some excellent teaching resources on the Global Learning website states:

> *'The SDG aims of sustainable living require us all to develop new ways of thinking and acting. SDGs provide unprecedented opportunities for countries and communities to work together for a sustainable and equitable world. They give purpose to work across the curriculum, with rich data and real-life scenarios around universal themes and current global issues. They open up debate around differing ways of tackling extreme poverty and inequality and alternative perspectives on poverty and wealth.'*

A school's Sustainability Task Force lobbied leaders to establish a Food Waste Café in the school grounds. Image: Torriano School.
(See case study on page 13.)

This is a sample of national curriculum statutory statements for primary[7] and secondary[8] subjects which provide scope for developing concepts, ideas, knowledge, skills, values and attitudes that relate directly to global citizenship education and have potential to provide a starting point for linking to, and exploring, the Sustainable Development Goals.

PRIMARY SCIENCE

- *develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them*
- *(pupils) are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future*
- *(pupils) recognise that environments can change and that this can sometimes pose dangers to living things. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates.*

PRIMARY GEOGRAPHY

- *(pupils) should develop knowledge about the world, the United Kingdom and their locality. They should understand basic subject-specific vocabulary relating to human and physical geography and begin to use geographical skills, including first-hand observation, to enhance their locational awareness.*
- *describe and understand key aspects of human geography, including: types of settlement and land use, economic activity including trade links, and the distribution of natural resources including energy, food, minerals and water*

PRIMARY HISTORY

- *(pupils explore) changes within living memory. Where appropriate, these should be used to reveal aspects of change in national life, events beyond living memory that are significant nationally or globally*
- *(pupils explore) the lives of significant individuals in the past who have contributed to national and international achievements.*

- *(pupils) understand historical concepts such as continuity and change, cause and consequence, similarity, difference and significance, and use them to make connections, draw contrasts, analyse trends, frame historically-valid questions and create their own structured accounts, including written narratives and analyses*

GCSE SCIENCE

- *(understand) relationships in an ecosystem, the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops*
- *(understand) changes in the environment which may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction; the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material*
- *develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively*
- *(understand) positive and negative human interactions with ecosystems*
- *(understand) Earth as a source of limited resources and the efficacy of recycling*
- *(understand) the production of carbon dioxide by human activity and the impact on climate*
- *(understand) fuels and energy resources*
- *explain everyday and technological applications of science; evaluating associated personal, social, economic and environmental implications; and making decisions based on the evaluation of evidence and arguments*

- GCSE GEOGRAPHY
  - *deepen understanding of geographical processes, illuminating the impact of change and of complex people-environment interactions,*
  - *develop and extend their knowledge of locations, places, environments and processes, and of different scales and social, political and cultural contexts (know geographical material)*
  - *gain understanding of the interactions between people and environments, change in places and processes over space and time, and the interrelationship between geographical phenomena at different scales and in different contexts (think like a geographer)*
  - *(have) more detailed contextual knowledge of two countries of contemporary global significance, in addition to the UK*
  - *(understand) the causes and consequences of uneven development at global level as the background for considering the changing context of population, economy and society and of technological and political development in at least one poorer country or one that is within a newly emerging economy*

- GCSE HISTORY
  - *develop and extend their knowledge and understanding of: specified key events, periods and societies in the history of their locality, Britain, and the wider world; and of the wide diversity of human experience*
  - *engage in historical enquiry to develop as independent learners and as critical and reflective thinkers*
  - *recognise that the discipline of history and a knowledge and understanding of the past helps them to understand their own identity and significant aspects of the world in which they live, and provides them with the basis for further wider learning and study*

Support for inclusion of the goals in planning

The possibilities and resources available to support goal-related teaching are vast, as is the plethora of ways in which individual schools interpret and personalise the national curriculum. To this end, I have devised a generic framework showing possibilities for where each SDG can link to areas of the curriculum:

Needless to say, the pedagogy required to deepen understanding of these issues must involve debate, critical thinking, problem solving and creativity; very much a P4C (Philosophy for Children) approach:

> *'Many sustainability issues, such as social justice, equality of access to resources, people's impact on the environment and natural habitats, can be controversial and may best be considered through discussion and debate. This allows pupils to explore their feelings about issues and think through their values, so developing their active citizenship.'*
>
> (Catling and Willy, 2009)[9]

Local issues are often the best starting point; for example controversial plans for new roads, fracking, changing local populations through immigration, local pollution levels, local food, flooding, local habitats in danger. Pupils have opportunities to become immersed in, and impassioned about, their local community, which opens the mindset to learning about and critically debating larger national and international issues such as Brexit, migration, climate change etc.

What needs to happen to ensure the goals are implemented consistently?

Against a backdrop of limited government support, it is essential to identify key policy areas where a focus on the goals is relevant; for example:

- Spiritual, Moral, Social and Cultural (SMSC) development where there is still a legal requirement for state schools to include these aspects of development as part of the curriculum and therefore they remain encompassed within the school inspection framework.
- Fundamental British Values: since January 2015 school inspections have been checking that schools promote 'fundamental British values' within the framework of SMSC development.

Inclusion as part of Teacher Training, good CPD for teachers and lobbying of governments, particularly when curriculum change is on the horizon, is essential. However, none of this is going to change immediately and therefore working with what currently exists within statutory subject disciplines and school structures – including testing and accountability – has to be the way forward. Senior leaders and head teachers will ultimately determine the way a school curriculum is constructed. They must be convinced of the value of a focus on the goals and know it will enhance and develop their pupils' ability to be active citizens and engaged learners, and lead to raised attainment.

Joyce Hallam retired Headteacher, Hawkshead Esthwaite Primary School; former geography consultant and support worker with the local Global Learning Programme (GLP).

Key Stage 1 children's work in progress, including a short animation that was shown at their school's STEAM (Science, Technology, Art and Maths) exhibition.
Image: Torriano School. *(See case study on page 13.)*

EE and the SDGs through STEM subjects

In January 2019, NAEE delivered two workshops at the Association for Science Education (ASE)'s conference – one for early years / primary and one for secondary – which looked at links between environmental education, the 17 SDGs and the curriculum, focusing on science and the other STEM subjects. The following are the main ideas that came from the workshops, which were attended by representatives from a range of educational settings, organisations and countries.

Primary education

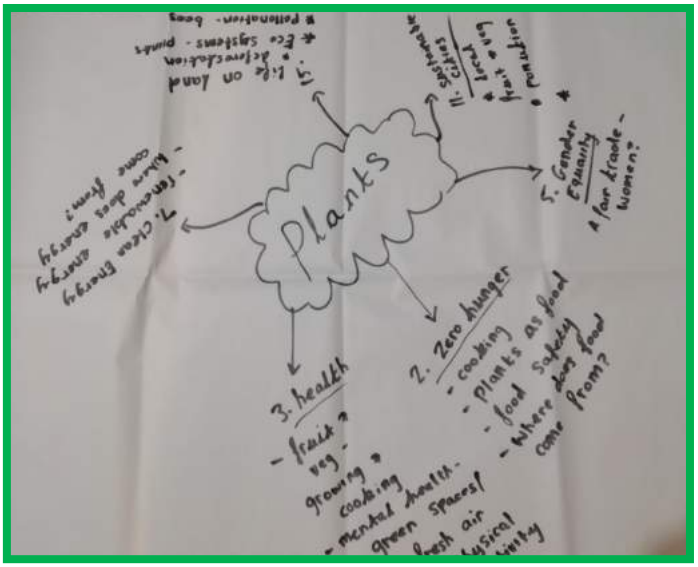
Primary educators mentioned forest schools and Eco-Schools as ways of engaging children in environmental education. One teacher mentioned a scheme of work[10] used by her school where the module 'Our Changing World' runs throughout the science curriculum for every year group. She did, however, note that activities such as monitoring birds and insects in the school grounds presented quite a challenge in the urban area of London where her school was situated.

A city council environmental education coordinator talked about how schools who 'do' the goals well are those who develop a whole-school ethos around the SDGs, by phrasing and delivering their current work and activities in a way that links to sustainability.

We were told about Sandfield Close Primary School in Leicester, where the whole school (including pupils, teachers, admin staff, dinner supervisors and cleaners) learned about the goals by filming their own version of the SDG launch film *'We the People for the Global Goals*[11]*.*

The groups in the primary workshop noted that plants and biodiversity are two of the easiest routes into a lot of the SDGs. They found links between studying, growing and cooking/eating plants and the following goals:

- Goal 2 Zero Hunger
- Goal 3 Health & Well-being (both physical health and mental well-being)
- Goal 5 Gender Equality (fair trade and women)
- Goal 7 Clean Energy (e.g. food waste for compost or biomass)
- Goal 11 Sustainable Cities (local fruit and veg production)
- Goal 12 Responsible Consumption & Production
- Goal 15 Life on Land



Links were also made between science and other subjects (e.g. studying plants in science also links to RE/PSHE: 'our world'; design and technology: making a healthy fruit salad); and between primary and secondary schools (especially those within Trusts), as the study of plants is something that links to the curriculum from 3-year-olds right up to 18-year-olds.

One of the primary groups chose to focus on goals 12 and 15, and looked at ideas for specific year groups. For example:

- Year 2 reusing plastic bottles to make bird feeders, and using alternatives to plastics (e.g. paper plant pots)
- Year 3 soils, including composting, using/finding the right kind of soils for particular plants, using transparent plastic bottles to create soil layers
- Year 6 adaptation and protecting species, encouraging pupils to make links between biodiversity, and why it is important to maintain/conserve it

Secondary education

In the secondary workshop, delegates talked about the 'heart' element of environmental education, i.e. having an emotional connection with the natural world as part of ourselves provides a basis for building more meaningful relationships to work with the natural world more sustainably.

One group in the secondary workshop chose Goal 7 Affordable & Clean Energy, and started mapping out the links to different aspects of science subjects. For example:

- Physics: forces, mechanics, waves, biomimicry design (e.g. humpback whale fins inspiring the design of wind turbine blades), solar, atomic energy
- Chemistry: pollution, fossil fuels v renewables
- Biology: biomass (e.g. studies are being done into whether the invasive water hyacinth could be used as a bio-fuel), photosynthesis (e.g. making low-cost dye sensitized solar cells)

The other group in the secondary session focused on Goal 15 Life on Land, particularly biodiversity, and the importance of linking this to the Required Practicals at GCSE and A-level. A recent examiners' report stated that RPs are not being done well in schools, due to lack of context. Environmental and sustainability education can provide these meaningful, real-life contexts to be explored with students.

It was noted that there are issues with things like trying to get Year 11s to go outside and look at / grow plants – they just don't want to do it *("it's just not cool!").* Therefore, teachers need to approach this work in a way that appeals to older students. For example: making seed bombs; carrying out actual improvements to their school grounds; celebration event, e.g. at the city council; getting primary school pupils to come and assess them *("they really up their game!").*

There was a discussion about how secondary science needs to be contextualised into decisions that are taken in the economic world, and political drivers. Some scientific decisions can be economically effective but environmentally disastrous. For example, fossil fuels are heavily subsidised, whereas non-fossils aren't and are therefore perceived as expensive.

A UK university-based teacher trainer expressed his disappointment that, at a recent meeting of secondary school heads of science, none of them even knew what the SDGs were. He felt that *"geographers know, and are doing, a lot about the goals*" and saw it as *"an opportunity to bridge the gap between science and geography in schools"*.

A curriculum developer from the International Baccalaureate (IB) explained how he had been working on a course called 'Environmental Systems and Societies'[12]. This is the only interdisciplinary course in the IB, approaching the environment from both the scientific and the humanities perspectives. The course is currently available at standard level, but they are working on developing it for a higher level, which will include a focus on the SDGs.

He pointed out that approaches to the SDGs can be a question of compulsion, i.e. some goals will be in the curriculum because they are culturally or locally important to the needs of the population. For instance, Goal 6 Clean Water and Sanitation is a big strand in sub-Saharan countries' curricula because it's important for children to learn about that. Conversely, children in developed countries may not see links between their lives and the goals so clearly.

Working with charities and NGOs

One of the Education Team at Royal Botanic Gardens, Kew explained how they will be launching 'The Big Question' in June, linked to their new online schools' platform 'Endeavour'[13] and the Kew Science website[14]. Each year, a question will be posed by the Director of Kew, based on a different SDG, starting with Goal 2 Zero Hunger.

A Centre Manager from the Woodcraft Folk explained how the SDGs go hand-in-hand with the values of their organisation[15]. Each week, groups across the country explore and unpack the goals, and the SDGs will be the theme of their youth-led international conference in 2020.

Juliette Green Co-editor, NAEE Environmental Education journal

Case Study: School 21 & the Sustainable Development Goals

One of School 21's founding principles is 'Today Matters'. Education does not have to be merely preparation, and schools are embedded in systems of inequality, ecological damage and discrimination as much as any other institution. They can be sites of pioneering practice today. School 21 is an all-through free school, started in 2012. The cohorts are intentionally small, with 70 students per year group, and it is located in Stratford, East London.

Project-based learning

Projects at School 21 are designed to combine rigour and motivation to solve real world problems. Each one is based on an enquiry question. For example, a project in 2017 aimed to answer the question: 'Can our maths help Stratford decide if 3 new concrete factories are too dirty?' Using algebraic modelling to analyse the impact of planned factories in the nearby Olympic Park on air pollution, they aimed to inform an 'authentic audience' (the planning permission panel). The students worked with professionals, including the mathematician Elsa Aristodemou and journalist Emilia Papadopoulos. They appeared on BBC London Evening News and soon after this the concrete factory was denied planning permission. They had made an impact towards Goal 11 Sustainable Cities and Communities. One of the project teachers, Jess Hughes, said:

"Students were motivated to really battle with seriously challenging maths and written reports, with no guarantee of success, because of the very real and tangible chance to make change: they had genuine agency."

Projects also involve a stimulus or grounding text. For one Year 5 project in 2018, the documentary *No More Girls and Boys*[16] inspired student-made mini documentaries about gender inequality at School 21, addressing Goal 5 Gender Equality. To collect data, students and staff were interviewed. Rachel Harzell, who led the project, said:

"It was powerful to make them question their local community, they had never really thought about it before."

Meanwhile, Year 1s addressed Goal 12 Responsible Consumption and Production by launching a protest at Stratford station aimed at reduction of plastic use in their local community. Year 1 teacher Kate Shearer said:

"The children really cared about it, they could see all the rubbish outside. They could see how it affected their immediate environment."

Student-run social enterprises

Transformative learning can involve praxis where learning happens through action and reflection. Through the Studio programme, student-run social enterprises (Six Media Lab, Green 21 and Ohana) operate within School 21's sixth form (Six21) to impact the local community. They use design thinking to act, prototype and learn from their experience.

In June, Six Media Lab launched 'Project Home'. They filmed and promoted a documentary on homelessness in Stratford, addressing Goal 10 Reduced Inequalities. Mark Blundell, head of Studio, described:

"Our main aim was to mirror the methods and working practices of a real world media agency… Some students took on the role of team leaders, accepting briefs from the directors and then pushing their team forwards towards milestones and objectives."

Teachers were directors of different areas of the organisation, and students chose one of six departments, including PR and social media, graphic design and the research department.

The Ohana project scrutinised diversity at School 21, addressing Goal 5. Students chose teams based on the model used by the cloud computing company Salesforce. Employees mentored each team and were the authentic audience for final presentations of what students had found. Joe Pardoe, one of the project teachers, said that the power was in the fact that: *"the work they do right now can make a difference to the world".*

Through the 'Six Sustainability Consultants' project, 'Green 21' aimed to make businesses in Stratford more sustainable, contributing to Goal 11. Each of the three teams had a different local organisation to consult: Stratford Library, Old Town Bistro and London Legacy Development Corporation. They were trained by members of the UCL Sustainability Team, and sustainability professionals from Amazon, Unilever and Kingfisher, to audit and write sustainability plans. One team leader said:

"The most powerful thing was knowing that we could make a tangible difference within our community, and giving us back our sense of power… sustainability is a multi-faceted, wicked problem and it is hard for us to deal with but having a group of people to do it with and being guided gave power back to us to make a change."

Another team leader said:

"We had control over our project in pretty much everything, so we weren't necessarily following instructions… having that technical advice from people who are in the industry gave us a sense of 'this is how people do it, let's adapt it'… I think about it on a daily basis now and it affects my life."

The school has a long way to go, not least in ensuring the long-term coherence of student action. Headteacher Oli de Botton also explained the need to help students understand their personal role in their communities:

"We need to work on personal empowerment, how you can 'swim in your own lane', as well as the importance of rigour and understanding the complexity of issues."

Projects and Studio at School 21 demonstrate that students can drive progress towards the Sustainable Development Goals now. The SDGs represent a global consensus on key issues society must address and ignoring them in schools can only add to what Meira Levinson (2012)[17] has called the 'civil empowerment gap'. Student action in their own school and community context recognises that change can't wait, and that learning does not take place in a vacuum.

Philip Bell History teacher and Head of Student Leadership, School 21. school21.org.uk

Case Study: How Torriano Primary approaches the SDGs

Torriano Primary in Camden, London, is an inclusive school community, diverse both ethnically and socioeconomically. Our curriculum aim is to begin the lifelong process of educating our school community to develop a global outlook, which is reflected in our school ethos and vision. A priority outcome of this approach is to encourage learners to be aspirant change makers. Their learning matters to them and is relevant to potential and actual challenges which humanity faces. Learners have opportunities to reflect on an understanding of self and of the world. We plan overtly to develop learners' competencies, which could, amongst other things, facilitate attitudinal change. The social and environmental dimensions of the curriculum are interwoven. Intensive engagement with the Global Goals in continuous interdisciplinary projects allows us to consider potential for a more sustainable world whilst engaging with related social issues.

Curriculum background

Curriculum development has long been predicated on our fundamental commitment to the United Nations Convention on the Rights of the Child (UNCRC) and UNICEF's Rights Respecting School Award programme (RRSA). Teaching and learning about rights was incorporated into the Torriano curriculum in 2009; its guiding principles being established as the core of our school ethos. This development has been further enhanced by our participation as a first wave expert partner school in the Global Learning Programme (GLP) and more recently in Ashoka's Changemaker Schools network.

This curriculum vision is nurtured through partnerships with cultural and community organisations, businesses, and NGOs to co-create our projects, which entail deep learning, real world contexts and a range of expertise. Our 'outstanding' rating by OFSTED and **all** our learners' SATS results attest to our belief that disciplined curriculum innovation and attainment are not mutually exclusive.

Curriculum and the Global Goals

Torriano has viewed the Global Goals as a key curriculum development driver to explore social and environmental issues relevant to the common good since 2015-16. The Millennium Development Goals (MDGs) had provided a prior context for beginning to develop age-appropriate competencies, which would enable collaborating and advocating for change.

Themes are invariably topical and locally relevant, highlighting universal values such as human rights, gender equality, cultural diversity, tolerance and environmental sustainability. We want the school community to be informed by its learning, improving their opportunities to help create a more just and sustainable world. We avoid over concentration on 'problems' or single issues to be solved or ameliorated. Our learners are optimistic and aware that humanity is our immediate concern, as the planet will remain, albeit much altered.

Project planning rationale

Project themes reflecting the school's vision and ethos are designed to incorporate sustainability, global citizenship and creative innovation. They are planned with our partners collaboratively across goal-related themes addressing content and outcomes, pedagogy and the learning environment. These interdisciplinary themes last an academic year and are implemented across the whole school. The learning context relates the different goals to one another while forming an overview of the 2030 Agenda.

Learning objectives and key competencies are considered alongside each other, attempting to make complex issues accessible and allow even the youngest learners to conceive of multiple stories and futures. The projects explicitly promote 'soft skills', with teachers referencing our recently revised competencies framework. All themes promote critical reflection, aiding learners to make connections between their lives and those of others. Subject leaders ensure national curriculum objectives are met throughout to maintain academic rigour.

Pedagogy and outcomes

Projects allow learners the autonomy to co-create investigations. Self-selected and directed Taskforce Teams immerse themselves in the organisation and planning of their advocacy activities in collaboration with staff project management teams. Their varied prior knowledge and experiences have provided learning stimuli within projects. Learners reflect from an early age that many futures are possible and their voice can advocate for one to most benefit the common good.

Inevitably our approach requires the key competency of effective communication. The school was a founder member of the Camden Oracy Hub, working in partnership with Voice 21, the Unicorn Theatre and Cambridge University. The programme in 2017-18 combined deep pedagogical knowledge with planning tools to support the practical application of oracy in class.

It has resulted in enhanced speaking and listening capabilities when global issues are discussed and debated. Our learners can express and justify their opinions and successfully advocate for a particular course of action on an issue. Clear self-expression and confidence, even when disagreeing, ensures effective, respectful communication in keeping with our RRSA principles.

Speaking more than one language, as many of our learners do, is also an asset for effective intercultural communication in our diverse community. Our learners are active listeners too – appreciating what is said and how it is being said.

Susan Bush Curriculum development consultant, Torriano Primary School. torriano.camden.sch.uk

Children making connections between the SDGs and their learning. Image: Torriano Primary School.

Urban science and the Sustainable Development Goals

Over two-thirds of the European population live in cities. Enabling those cities to deliver services sustainably while keeping their citizens healthy, prosperous and well-informed is amongst the most important challenges we face. The pan-European Urban Science project is an education response to this, seeking to improve the teaching of inquiry-based learning so that pupils develop the competences to actively contribute to creating healthy cities, gain scientific skills, and envision cities for their future.

Urban Science uses outdoor inquiry-based learning whereby urban areas become living-laboratories that help pupils explore how science can create healthier and more sustainable places to live. It is solutions based; placing a strong emphasis on creativity and problem solving to ensure scientific understanding can be applied in a meaningful context.

Tackling the SDGs, and the practice of sustainability, requires far more than understanding. Exploring what we mean by 'understanding' we come quickly to the conclusion that it is not just about scientific reasoning: the rational aspect of science. Although important, reason needs to sit alongside our emotions, values and humanity; this is where true understanding emerges. By taking a more holistic view of understanding, we can move beyond pieces of information to seeing the patterns and processes which link them together. For learning to be effective it must include our emotive responses to the world; we need to understand the whole system that is operating, not just each individual piece of the jigsaw.

The same is true for the SDGs; we cannot address poverty (Goal 1 No Poverty) without providing better access to non-polluting energy sources (Goal 7 Affordable and Clean Energy); or provide justice (Goal 16 Peace, Justice and Strong Institutions) without meaningful work (Goal 8 Decent Work and Economic Growth). And, of course, a Quality Education (Goal 4) should support the delivery of all the SDGs. Urban Science is an attempt to steer science education towards a more holistic and interconnected view, one which incorporates understanding through knowledge and emotions, which places science as a servant for bringing healthy and vibrant cities (Goal 11 Sustainable Cities and Communities) into reality.

The SDGs provide an overall framework for Urban Science content, with curriculum content mapped against them. This 'framework' supports a holistic approach to sustainable cities. Urban Science will produce learning modules based on linked urban themes with relevant curriculum content. All link with a wider city perspective ensuring the whole system is not lost in the 'parts'.

Take biodiversity (Goals 14 Life Below Water, and 15 Life On Land) as an example: typically, schools will plan an investigation of their school grounds through appropriate sampling techniques. But do they tend to use this as a launch pad to bring deeper connections? For example, biodiversity can be linked with food production (Goal 2 Zero Hunger) through pollination, and green spaces for Good Health and Well-being (Goal 3). The natural world offers connections that can develop deeper levels of empathy towards other species and ourselves. After all, science can tell us what the problem is and even offer solutions, but without a strong emotional drive we rarely act.

Urban Science attempts to go beyond the narrow confines of curriculum, offering pupils novel ways to explore how sustainability impacts their lives; it attempts to light fires so pupils take more ownership and control of their learning. A standard biodiversity monitoring activity can become an opportunity for pupils to use the results to develop seed papers to increase local biodiversity, or explore ways to improve access to green spaces in their community. This can lead to further follow-up work in the months and years to come as biodiversity improves. Science capital will be increased as they gain more opportunities to have casual informal science conversations in their communities.

This is the challenge and opportunity Urban Science is taking up, creating learning that delivers curriculum and inspires teachers and pupils to go further. In doing so, we hope pupils and teachers will develop a more systemic appreciation of the SDGs as interacting nodes; part of the pieces, patterns and processes that make up the world we rely on. We welcome you on the journey.

Richard Dawson Director, Wild Awake; **Margaret Fleming**, Independent Science and Environmental Education Consultant. urbanscience.eu

Outdoor learning and the Sustainable Development Goals

Frog or toad? Image: Froglife

Is it a frog or a toad? For a surprising number of us, a childhood encounter with a frog, toad or tadpole is one of our earliest wildlife memories. At Froglife, as we approach Goal 4 Quality Education with a generation that has had fewer opportunities to engage with nature[18], these hands-on experiences are essential.

Amphibians are a fascinating way to learn about nature for all generations:

> "*We have 4 and 5 year olds who can describe in detail the difference between frogs and toads."*
>
> (Teacher, Broomhill Infants, Sheffield)

Through active learning and investigating how tadpoles develop over several weeks with Froglife[19], these same children *"can talk at length about amphibians, herbivores, carnivores, lifecycles…" (ibid).*

As well as the science curriculum links, teachers note the opportunities to raise standards overall:

> *"The outdoor activities supported the school's improvement plan on outdoor learning …. all of this work developed an understanding and empathy to the situation of wildlife"* (Sheffield School)

As to what the children think about hands-on and outdoor learning, Rhiannon explains it well[20]:

> *"It was a different kind of learning than in school."* (Rhiannon, age 7, Ruchill Community Centre, Glasgow)

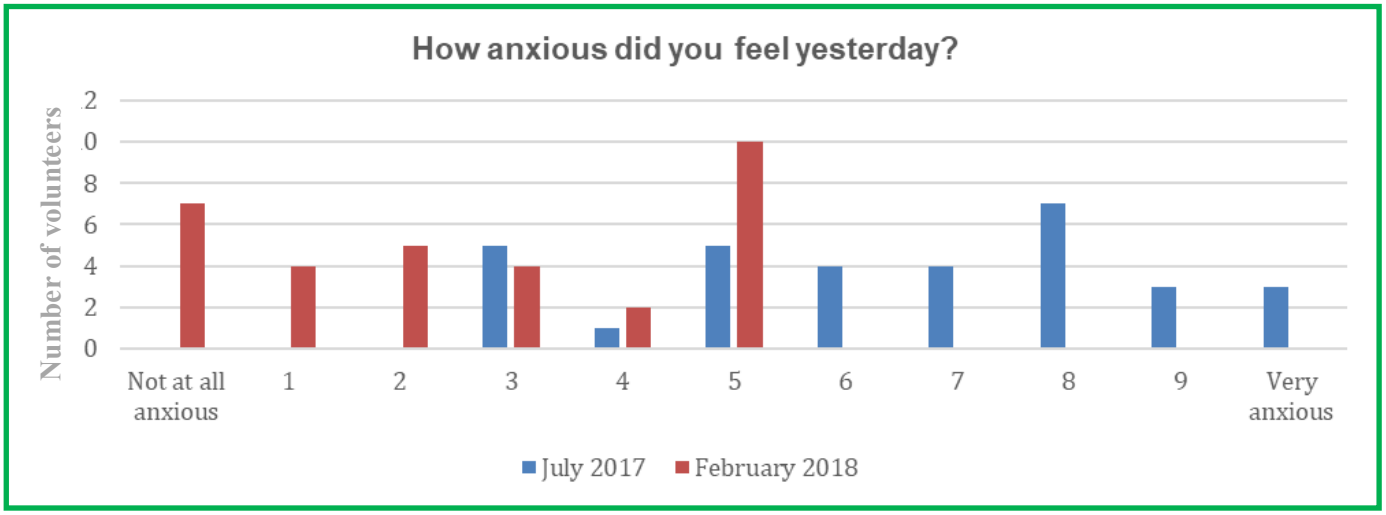
This next comment is interesting too, as it shows the wide range of skills and experiences that children and young people are looking for:

> *"I felt responsible, creative, helpful and happy."* (John, age 16, Rosemount, Glasgow)

Furthermore, it is lovely to see that outdoor learning can spark creativity, even on a feedback form:

> *"It was amphabulous!"* (Primary 4 pupil, Glamis Primary School)

Outdoor learning is central to Froglife's work towards Goal 3 Good health and Well-being. We are particularly interested in how our work can support mental health: Can digging a pond and creating habitats for wildlife improve our mental health? Through Froglife's Natural Achievers project[21], working with adults referred to us due to mental health issues, we asked a range of questions including: How anxious did you feel yesterday?" and found an interesting change over time, as this graph shows:



Most of the volunteers were feeling anxious or very anxious in July 2017 whereas most were feeling a lot less anxious by February 2018, after less than a year of weekly conservation activities. It is likely to be a mixture of regular exercise, companionship and the feel-good factor of making a difference in their local green spaces.

When we asked young people, many of whom had mental health issues, what they thought after conservation activities, some focussed on changes in their health:

"I love the project it helps me relax because I have autism and I think a lot." (Service user, Connect Support)

"It is a great project I don't think about my depression when I am busy with helping the wildlife, thanks Froglife!" (Service user, Care in Mind)

"Kirklees Green Pathways has helped me with confidence as I did not like socialising, I now do teamwork – thank you." (Student, Greenhead College)

Others appreciated the broader differences in their lives, particularly what they learnt and how they feel:

"I have learnt loads about wildlife, growing vegetables and outdoor tasks, I have never done anything like this before, thank you." (Student, Institute of Islamic Education)

"The project has made a difference to my life as I have become more confident in my skills and I know that I can do things if I try, thanks." (Service user, Batley Foyer)

Through their conservation work, these volunteers had the satisfaction of knowing that they have improved habitats for wildlife, which also contributes to Goal 15 Life on Land. For Froglife overall, we created and restored 224 wildlife sites covering 105.8 hectares in 2016-17.

Finally, if you have any niggling doubts as to whether that initial image is a frog or toad… it's a frog (the warty skin on a toad is a good clue)![22]

Sheila Gundry Development Manager for Education, Learning and Communications, Froglife. froglife.org

Thinkpiece: EE and the SDGs — all in it together?

Thinking about where the UN Sustainable Development Goals (SDGs) and environmental education overlap, two answers spring to mind: 'outside' and 'within'.

The outdoors doesn't come in corralled packages labelled 'society', 'economy', etc. and neither does the learning that happens there. Whether our topic is arachnids or architecture, by taking it outside we invite our learners to look around them, get some exercise, renegotiate their relationships, develop an interest, if not a passion, for their environment as they begin to make connections between the topic of study and the wider world – as well as, ideally, having fun. By enabling learners to make these connections, EE transgresses academic disciplines and fixes the learning back into the world we inhabit rather than separating it off.

This is where the SDGs come in. For perhaps the first time, an internationally agreed set of priorities provides us with a map full of connections. At first glance, all those coloured boxes can be bewildering but presented as a conclusion to outdoor, connective learning, the SDGs can help us see how health, wealth, cities and spiders might all feature in one overarching framework.

The ability to make connections, unforeseen or otherwise, is surely one learning outcome worth measuring.

As for 'within' – our minds are no more compartmentalised than the outdoors. Despite the mental frames that schooling imposes as it differentiates between disciplines, we all unlearn this as we reassemble our world in ways that have meaning for us. Organisations that work on sustainability issues sometimes struggle to find effective ways of framing issues so that they can connect to our busy lives. Again, the SDGs can help us here, not by starting with the whole list of goals but by mapping the connections that start with you and me and leading to the wider concerns that organisations wish to raise. For once we have a set of international priorities that demonstrate that we really are all in it together.

Dr Paul Vare Senior Lecturer, School of Education, University of Gloucester. glos.ac.uk

Postcript: why the goals are important to schools

If we're to think about what schools might do in relation to the Sustainable Development Goals, it's important to think about outcomes. At a very basic level, perhaps we have four kinds of responsibility as citizens which are to:

i understand that the goals are important
ii think critically about the goals in relation to people's lives and interests
iii weigh arguments and discuss possibilities and practicalities
iv get involved whilst reflecting on the appropriateness of actions

So what can schools do as a preparation for such a citizenly role? And what are the practical ways forward? Perhaps educators also have four kinds of responsibility which are to:

i help learners understand why the goals ought to be of concern to them
ii enable learners to gain plural perspectives from a range of viewpoints
iii provide opportunities for an active and critical exploration of issues
iv encourage learners to come to their own views and to get involved

Given the state of the world, doing less than this seems irresponsible. However, doing much more runs the risk of indoctrination as there's a need to stimulate without prescribing and to see conceptual frameworks as scaffolding to build learning around, rather than as cages to restrain ideas and creativity.

This is, of course, a liberal educational view that puts student learning first. This view says that educational institutions must always prioritise student learning over institutional, behaviour or social change. It also says that we should make use of any change that's happening to support and broaden that learning. In this sense, it's fine for a school, college or university to encourage its students to become involved, and through that involvement, explore the goals, enhance social justice, save energy, create less waste, promote biodiversity etc.

But there are limits. Jensen and Schnack[23] make the point with force that, ultimately, the crucial factor must always be what students learn from participating in such activities:

> *"…it is not and cannot be the task of the school to solve the political problems of society. Its task is not to improve the world with the help of pupils' activities…The crucial factor must be what students learn from participating in such activities…"*

Thus, a successful liberal education in schools today will be taking these goals seriously in what it does. At its heart will be students asking critical questions of society (quite easy), of their learning (much trickier), and of their institution (potentially very risky) – looking for the need for change, and getting involved. In this sense, schools are important in nurturing thinking and learning about what might constitute appropriate futures, and in helping students begin to develop skills and competences by doing so. In these ways our young people can be helped to understand the issues, to ask pertinent questions, to understand how to make themselves heard, and how to make a difference.

It's an unpredictable business though, and it's easy to imagine that a student might learn something that a school or teacher would rather they hadn't. If, at the end of a learning programme about the goals, a student comes up to you and says this:

> *"That was fantastic. Such a great programme; so many insights. I've learned so much. Thanks, in particular, for the really stimulating way that you approached it. Having thought about it a lot I'm convinced that we should take the goals very seriously. However, I don't agree with all this criticism of intensive agriculture and think that our priority should be to grow as much of our own food as possible."*

As an educator, what do you think? Do you think you've done a good job – here's someone who's thinking about the issues and for themselves – not to mention all that praise for you. Or do you think you've failed utterly because they're not thinking the right sort of thing? If you're an educator, surely there is only one possible answer here.

Professor William Scott Chair of Trustees, National Association of Environmental Education (UK)

Useful websites

The United Nations

The UN says that the Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice. The goals interconnect and in order to leave no one behind, it is important that we achieve each goal and target by 2030.

tinyurl.com/yafaeg9p

Oxfam Education

The Oxfam Education website offers ideas, resources and support for developing global learning in schools in order to helps pupils understand their world and make a positive difference in it.

oxfam.org.uk/education

UK Stakeholders for Sustainable Development

UKSSD is a cross-sector network of organisations spanning business, civil society, academic and public spheres who work together to drive action on the goals in the UK. UKSSD aims to influence people, communities and organisations to work together to drive change.

ukssd.co.uk

Global Environmental Education Partnership

GEEP's mission is to create a learning network to build capacity in member countries to strengthen and institutionalise environmental education, focusing on policy, professional development, evaluation and best practices. The *Act Now for EE* webpages show detail of how environmental education can contribute to the realisation of the goals.

thegeep.org **actnowforee.org**

The Global Goals

The Global Goals website says that everyone can contribute to making sure the goals are met. There are lots of free images to use in your work and the news pages contain goal-specific information.

globalgoals.org

The UK Office for National Statistics

The Office for National Statistics is responsible for reporting the country's data to the United Nations, including with relation to the SDGs.

tinyurl.com/yaazpkx8

TEESNet

The Teacher Education for Equity and Sustainability Network aims to develop a UK-wide community of practice in education for sustainable development and global citizenship within teacher education in higher education and schools, that shares research and practice to develop new understanding across the sector in the UK and beyond.

teesnet.liverpoolworldcentre.org

The World's Largest Lesson

The World's Largest Lesson produces resources for educators to teach lessons, run projects and stimulate action in support of the goals. These resources include films written by Sir Ken Robinson and animated by Aardman. These establish a context for the goals and set out to inspire students to use their creative powers to support and take action in support of the goals.

worldslargestlesson.globalgoals.org

Christian Aid

Christian Aid says climate change is the biggest challenge we face. It adds:

> *"We hold a vision of a better world, free from poverty and climate change. Where everyone has enough to eat, and can live without fear of their home being destroyed. But right now, millions of the world's poorest people are feeling the worst impacts of climate change, and experts predict more floods, drought and extreme weather patterns to come. For those living in poverty, this means more hunger, conflict and insecurity, and a more uncertain future for us all".*

In the UK, Christian Aid's 'Be a Hero Go for Zero' campaign is promoting a shift away from fossil fuels and into renewable energy.

christianaid.org.uk/schools

SOS-UK

SOS-UK is a new charity being set up by the National Union of Students (NUS) so that it can do more extensive environmental and sustainability work. It will come into being on July 1st 2019 and will work through three programmes:

- Getting more students leading on, and learning about, sustainability
- Embedding sustainability in formal education, from early years to adult learning
- Making sustainability more inclusive, for everyone

NUS thinks that the pace at which society is reforming to become sustainable is far too slow, and believes that education is the catalyst needed to speed things up.

sustainability.nus.org.uk/our-works

St George's House, Windsor

St George's House, Windsor is a place where people come together to explore and communicate their views and analysis of contemporary issues. In late 2017 a group met to consider young people and the SDGs. The outcome of the meeting, which includes school and NGO case studies, is here: tinyurl.com/yypzqwud

stgeorgeshouse.org

The UK Student Climate Network

The UK Student Climate Network is making 4 demands of government about climate. It says that government should:

- declare a climate emergency and prioritise the protection of life on Earth, taking active steps to achieve climate justice.
- reform the national curriculum to address the ecological crisis as an educational priority.
- communicate the severity of the ecological crisis and the necessity to act now to the general public.
- recognise that young people have the biggest stake in our future, by incorporating youth views into policy making and bringing the voting age down to 16.

ukscn.org

The Association for Science Education (ASE)

ASE is the UK's largest professional body representing science teachers. A special online supplement on sustainability education was published in November 2018: tinyurl.com/y2p2hgkv.

ASE publishes a wide range of curriculum resources, for age groups from pre-school to pre-university, e.g. earth and space, habitats, environment and ecosystems, and earth and atmospheric science.

ase.org.uk

The Geographical Association

The Geographical Association is the *"leading subject association for all teachers of geography."* It publishes a wide range of resources for schools and teachers, including in relation to the SDGs: tinyurl.com/y2rk3os9

geography.org.uk

The 17 Sustainable Development Goals (SDGs)

	Summary	Goal Statement
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 & Well-being for People**	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 & Sanitation**	Ensure availability and sustainable management of water and sanitation for all.
7	**Affordable & Clean Energy**	Ensure access to affordable, reliable, sustainable and modern energy for all.
8	**Decent Work & Economic Growth**	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
9	**Industry, Innovation & Infrastructure**	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
10	**Reducing Inequalities**	Reduce income inequality within and among countries.
11	**Sustainable Cities & Communities**	Make cities and human settlements inclusive, safe, resilient, and sustainable.
12	**Responsible Consumption & Production**	Ensure sustainable consumption and production patterns.
13	**Climate Action**	Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.
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 eco-systems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
16	**Peace, Justice & Strong Institutions**	Promote peaceful and inclusive societies for sustainable devel-opment, 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.

The UN Development Programme [UNDP] – tinyurl.com/y7hewe9u – has facts and figures for each of the goals, along with a summary of the issues at stake, and mini case studies of the 'goals in action.

The UN's Sustainable Development Solutions Network website – tinyurl.com/ybpefkgm – has details of the 169 targets associated with the goals.

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