Finding the Earth in the UN Sustainable Development Goals
Map for yourself the areas where Earth studies are linked to the UN SDGs

The United Nations introduces its development goals at: https://www.un.org/sustainable development/sustainable-development-goals/ as follows: '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.'

This image, published by the United Nations has been left in the public domain in order to disseminate "as widely as possible the ideas (contained) in the United Nations Publications".

Map for yourself the possible role of geoscience in these goals using the grid below. Either tick the boxes or shade them in, where there could be strong links between the Development Goal and geoscience. See 'Underlying principles' below for a definition of capacity building.

Group definitions		
Earth Materials, Processes and Management	Use a colour or a tick for this section	Colour
Skills and practice	Use grey or a tick for this section	Grey

More details of these eight aspects are given in the table in the 'Context' section →

Sustainable Development Goals (STGs)				Geological sciences: Earth Materials, Processes and Management: Agrogeology	Climate change	Energy	Engineering geology	Geohazards	Geoheritage and geotourism	Hydrogeology and contaminant geology	Minerals & rock materials	Skills & Practice: Education #	Capacity building #
	1	**No Poverty**	End poverty in all its forms everywhere.										
	2	**No Hunger**	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.										
	3	**Good Health**	Ensure healthy lives and promote well-being for all ages.										
	4	**Quality Education**	Ensure inclusive and equitable quality education and promote life-long 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	**Clean Energy**	Ensure access to affordable, reliable, sustainable and modern energy for all.										
	8	**Good Jobs & Economic Growth**	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.										
	9	**Innovation & Infrastructure**	Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.										
	10	**Reduced Inequalities**	Reduce inequality within and among countries.										
	11	**Sustainable Cities & Communities**	Make cities and human settlements inclusive, safe, resilient and sustainable.										
	12	**Responsible Consumption**	Ensure sustainable consumption and production patterns.										
	13	**Protect the Planet**	Take urgent action to combat climate change and its impacts.										
	14	**Life below Water**	Conserve and sustainably use the oceans, seas and marine resources for sustainable development.										
	15	**Life on Land**	Protect, restore and promote sustainable use of terrestrial ecosystems*										
	16	**Peace & Justice**	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.										
	17	**Partnerships for the Goals**	Strengthen the means of implementation and revitalise the global partnership for sustainable development.										

*Notes: * (Abbreviated) Protect restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. # Education and Capacity Building are important in some degree within every goal.*

The back up

Title: Where is the Earth found in the UN Sustainable Development Goals?

Subtitle: Map for yourself the areas where Earth studies are linked to the UN SDGs

Topic: A mapping exercise to work out where geoscience is an important part of meeting the UN Sustainable Development Goals by 2030.

Age range of pupils: 16 years +

Time needed to complete activity: 20 minutes

Pupil learning outcomes: Pupils can:

- describe and explain the 17 UN SDGs;
- identify and explain those goals where geoscience plays an important part;
- debate and defend their thinking and decisions.

Context:
The table below has more details of each of the eight aspects of geological science contained in the grid (taken from Gill, 2017).

Geological Sciences (Earth Materials, Processes and Management)	Description
Agrogeology	The use of rock and mineral resources to improve agriculture through improving soil fertility and water retention, and reducing soil erosion.
Climate Change	Using the geological record to understand past changes to the climate and applying this knowledge to understand how the climate may change in the future.
Energy	Identifying and advising on potential energy sources (e.g., geothermal, hydrocarbons) and raw materials required for energy supply and infrastructure (e.g., uranium ore for nuclear energy, iron ore for wind turbines, cadmium for photovoltaic cells). Contributing to the safe extraction and storage of resources and the development of energy infrastructure.
Engineering Geology	The application of geological sciences to engineering, supporting the design and construction of infrastructure at all scales (e.g., dams, roads, tunnels, airstrips, ports, pipelines, shelters).
Geohazards	Understanding the physical science underlying the generation of natural hazards, including landslides, earthquakes, tsunamis and volcanic eruptions. Assessing exposure through producing hazard maps. Supporting efforts to reduce vulnerability through geoeducation and capacity building initiatives.
Geoheritage & Geotourism	Using geology and landscapes within tourism, aiding the conservation of geodiversity and building a greater understanding and appreciation of the geological sciences by tourists and those communities living and working around geological features.
Hydrogeology & Contaminant Geology	Understanding and sustainably managing groundwater resources. Using geological sciences to assess, monitor, and remediate contamination, including understanding the origin, transportation and fate of contaminants.
Minerals and Rock Materials	The use of geological sciences to identify and develop mineral and rock resources, for a variety of uses (e.g., ores for metal production, limestone for building stone or glass).

This exercise has previously been carried out and published as a paper in a scientific journal which you can read in full at: http://www.episodes.org/view/1835.

The conclusions the authors came to are shown in the grid on the next page.

Group definitions		
Earth Materials, Processes and Management	Understanding of '**Earth Materials, Processes & Management**' is important to one of more targets/means of implementation relating to the given SDG	Colour
Skills and practice	Sharing of and/or changes to geological '**Skills and practice**' is important to one or more targets/means of implementation relating to the given SDG	Grey

Sustainable Development Goals (STGs)				Geological sciences: Earth Materials, Processes and Management: Agrogeology	Climate change	Energy	Engineering geology	Geohazards	Geoheritage and geotourism	Hydrogeology and contaminant geology	Minerals & rock materials	Skills & Practice: Education #	Capacity building #
	1	**No Poverty**	End poverty in all its forms everywhere.										
	2	**No Hunger**	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.										
	3	**Good Health**	Ensure healthy lives and promote well-being for all ages.										
	4	**Quality Education**	Ensure inclusive and equitable quality education and promote life-long 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	**Clean Energy**	Ensure access to affordable, reliable, sustainable and modern energy for all.										
	8	**Good Jobs & Economic Growth**	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.										
	9	**Innovation & Infrastructure**	Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.										
	10	**Reduced Inequalities**	Reduce inequality within and among countries.										
	11	**Sustainable Cities & Communities**	Make cities and human settlements inclusive, safe, resilient and sustainable.										
	12	**Responsible Consumption**	Ensure sustainable consumption and production patterns.										
	13	**Protect the Planet**	Take urgent action to combat climate change and its impacts.										
	14	**Life below Water**	Conserve and sustainably use the oceans, seas and marine resources for sustainable development.										
	15	**Life on Land**	Protect, restore and promote sustainable use of terrestrial ecosystems*										
	16	**Peace & Justice**	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.										
	17	**Partnerships for the Goals**	Strengthen the means of implementation and revitalise the global partnership for sustainable development.										

Notes: * (Abbreviated) Protect restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. # Education and Capacity Building are important in some degree within every goal.

The academic paper concludes: 'This … framework seeks to do the following: (i) mobilise and motivate the broader geological community to engage in the Sustainable Development Goals, allowing those working on specific aspects of geology to consider their work in the context of sustainable development; and (ii) demonstrate the role of geology within sustainable development to other disciplines, policy-makers and development practitioners. (p76).

Following up the activity:

1. Ask the pupils to carry out further analysis, either using the data from their own work or the published data above, by:
   - ranking the SDGs from the one most impacted by geoscience to the one least impacted (in the published example, from Poverty to Reduced Inequalities and Peace & Justice);
   - calculating what percentage of the grid is impacted by geoscience (in the published example 48/170x100 = 28%).
2. Ask them to prepare a simpler version of the goals, as described on the left-hand-side of the matrix that could be used with younger people (see: https://www.un.org/sustainable development /sustainable-development-goals/)
3. For those SDGs where no geoscience impacts could be find, ask them to examine the detailed targets behind the goals (that can be found at: https://www.un.org/sustainabledevelopment/sustainable-development-goals/ by clicking on the goal and then clicking on 'read more about goal ..') to see if geoscience links can be found there.
4. Ask the pupils if they can find any examples of where, achieving one SDG will make it harder to achieve another SDG.

Underlying principles:

- Capacity building can be defined as: **"**the process by which individuals and organisations obtain, improve, and retain the skills, knowledge, tools, equipment and other resources needed to do their jobs competently or to a greater capacity (larger scale, larger audience, larger impact, etc)." (Wikipedia).
- From the abstract of the paper (p70): 'These internationally-agreed [SDG] goals aim to eradicate global poverty, end unsustainable consumption patterns, and facilitate sustained and inclusive growth, social development, and environmental protection.
- Geoscience has a vital role to play in all but one of the goals shown on the matrix (in the published paper, geoscience is shown to impact on that goal too); it has a major role to play in some of the goals.

Thinking skill development:
Pupils have to bridge their geological understanding into a new situation, described by the SDGs.

Resource list:

- a copy of the blank grid for each pupil or group of pupils

Useful links:
There is much more information on the SDGs at: https://www.un.org/sustainabledevelopment/sustainable-development-goals/. There you can click on the specific goals to discover more about each issue.
The full paper can be downloaded from: http://www.episodes.org/view/1835
Capacity building definition: https://en.wikipedia.org/wiki/Capacity_building.

Background reading for staff - *Geoscience Engagement in Global Development Frameworks* - https://www.annalsofgeophysics.eu/index.php/annals/article/view/7460

Source: This Earthlearningidea is based on an academic paper entitled '*Geology and the sustainable development goals'* published by Joel Gill from the British Geological Survey (2017*) Episodes* 40(1), 70-76. The idea of making this into a pupil-exercise came from Professor Iain Stewart, Plymouth University, UK.

This image, published by the United Nations has been left in the public domain in order to disseminate "as widely as possible the ideas (contained) in the United Nations Publications".