# 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: <a href="https://www.un.org/sustainable\_development-goals/">https://www.un.org/sustainable\_development\_goals/</a> 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.'

1	NO Poverty	2 ZERO HUNGER	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION
7	AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13	CLIMATE ACTION	14 LIFE BELOW WATER	15 LIFE ON LAND	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS	THE GLOBAL GOALS For Sustainable Development

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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.

Grou	Group definitions								Geo	logical so	ciences				
Earth Proc	n Mate esses ageme	rials, and	Use a colour or a tick for this section	Colour		Earth	arth Materials, Processes and Management								lls & ctice
		practice	Use grey or a tick for this section	Grey				logy			logy				# 6
			details of these eight aspects ven in the table in the 'Context' se	ection	Agrogeology	Climate change	Energy	Engineering geology	Geohazards	Geoheritage and geotourism	Hydrogeology and contaminant geology	Minerals & rock materials		Education #	Capacity building
	1	No Poverty	End poverty in all its forms ever	ywhere.											
	2	No Hunger	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.												
	3	Good Health	Ensure healthy lives and promotor for all ages.												
	4	Quality Education	Ensure inclusive and equitable education and promote life-long opportunities for all.												
	5	Gender Equality	Achieve gender equality and en women and girls.	npower all											
_	6	Clean Water & Sanitation	Ensure availability and sustainable management of water and sanitation for all.												
STGs	7	Clean Energy	Ensure access to affordable, reliable, sustainable and modern energy for all.												
Sustainable Development Goals (STGs)	8	Good Jobs & Economic Growth	Promote sustained, inclusive ar economic growth, full and produ employment and decent work for	nd sustainable uctive											
pment	9	Innovation & Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.												
evelo	10	Reduced Inequalities	Reduce inequality within and ar	mong countries.											
nable D	11	Sustainable Cities & Communities	Make cities and human settlem safe, resilient and sustainable.	ents inclusive,											
ustai	12	Responsible Consumption	Ensure sustainable consumption production patterns.	n and											
S	13	Protect the Planet	Take urgent action to combat cl and its impacts.	limate change											
	14	Life below Water	Conserve and sustainably used seas and marine resources for development.												
	15	Life on Land	Protect, restore and promote su of terrestrial ecosystems*												
	16	Peace & Justice	Promote peaceful and inclusive sustainable development, provi justice for all and build effective and inclusive institutions at all le	de access to , accountable											
	17	Partnerships for the Goals	Strengthen the means of impler revitalise the global partnership development.	mentation and											

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: <a href="http://www.episodes.org/view/1835">http://www.episodes.org/view/1835</a>.

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

Group definitions	Group definitions									
Earth Materials, Processes and	Understanding of 'Earth Materials, Processes & Management' is important	Colour								
Management	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								

Group definitions									Geol	ogical so	iences						
Earth Materials, Understanding of 'Earth Materials,				Earth Materials, Processes and Management									ls &				
	esses				Colour											tice	
		to one of more targets/means of		Coloui				_			_		1 1				
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Skills and			Sharing of and/or changes to geological				a)		l g		рL	Hydrogeology and contaminant geology	~			ng	
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						Agrogeology	Climate change	Energy	Engineering geology	Geohazards	Geoheritage and geotourism	<del>5</del> 6	Minerals & rock materials		Education #	Capacity building #	
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	1	No F	Poverty	End poverty in all its forms every	where.												
				End hunger, achieve food secur										Ī			
	2	No I	Hunger	improved nutrition, and promote	sustainable												
				agriculture.													
	3	Good	l Health	Ensure healthy lives and promot	e well-being												
		0000	incailii	for all ages.													
		0	uality	Ensure inclusive and equitable of										1			
	4			cation	education and promote life-long learning												
				opportunities for all.													
	5		ender	Achieve gender equality and empower all													
			uality	women and girls.										-			
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2	7	Clear	Energy	Ensure access to affordable, reli													
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\ \frac{1}{2}				Build resilient infrastructure, pro													
e	9	-	Innovation & Infrastructure	and sustainable industrialisation													
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읒		Re	duced														
8	10	Inequalities		Reduce inequality within and am	ong countries.												
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윰	11		ies &	Make cities and human settleme	nts inclusive,												
na		Com	nunities	safe, resilient and sustainable.													
Sustainable Development Goals (STGs)	12	Resp	onsible	Ensure sustainable consumption	and												
sn	12	Cons	umption	production patterns.			<u> </u>		L								
S	13	Prot	ect the	Take urgent action to combat cli	mate change												
	13	Pl	anet	and its impacts.										]			
		Lifo	below	Conserve and sustainably use the					1					1			
	14		ater	seas and marine resources for s	ustainable				1					1			
		۷,		development.					ļ					1			
	15	Life	on Land	Protect, restore and promote su	stainable use												
				of terrestrial ecosystems*										1			
			_	Promote peaceful and inclusive													
	16	-	ace &		sustainable development, provide access to					1							
		Ju	stice	justice for all and build effective,													
				and inclusive institutions at all le		+	<b> </b>		<b> </b>								
	47	Partn	erships	Strengthen the means of implem					1								

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).

development

revitalise the global partnership for sustainable

## Following up the activity:

for the Goals

- 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: <a href="https://www.un.org/sustain">https://www.un.org/sustain</a> abledevelopment/sustainable-developmentgoals/ 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: <a href="https://www.un.org/sustainabledevelopment/sustainable-development-goals/">https://www.un.org/sustainabledevelopment/sustainable-development-goals/</a>. There you can click on the specific goals to discover more about each issue.

The full paper can be downloaded from: <a href="http://www.episodes.org/view/1835">http://www.episodes.org/view/1835</a>
Capacity building definition: <a href="https://en.wikipedia.org/wiki/Capacity\_building">https://en.wikipedia.org/wiki/Capacity\_building</a>.

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 lain Stewart, Plymouth University, UK.



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