

**WHAT'S THE USE?**  
RICHARD BUSTIN

**HOW CAN EARTH MEET OUR RESOURCE NEEDS?**

  
Geographical Association

**KS3 GEOGRAPHY TEACHERS' TOOLKIT**  
EDITED BY ALAN KINDER AND JOHN WIDDOWSON

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BUST



**FUTURE FLOODS**



**FASTER, HIGHER, STRONGER**



**LOOK AT IT THIS WAY**



**INTRODUCING INDIA**



**THE ROLE OF STONES**



**THROUGH THICK AND THIN**

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The *Key Stage 3 Geography Teachers' Toolkit* series is designed to help teachers create an exciting and challenging curriculum for their students by building geographical knowledge, ideas and skills into the exploration of important places, themes and issues around the world. The series provides guidance to teachers of geography to help them manage each new curriculum challenge with confidence.

We are delighted to be undertaking a major expansion of this award-winning series. The world around us is ever-changing; so too are the demands of the geography curriculum! The first new additions to the series explore the emerging economies of Asia, delve deep into the geology of Britain, visit remote and extreme glacial environments and enquire into the way in which human use of resources places an increasing strain on our planet.

Each title in the series, written by outstanding teachers of geography, provides a complete unit of work: a bank of ready-made lesson plans with downloadable activities and resources to bring the real world into your classroom.

For busy teachers of geography, each *Toolkit* provides material for immediate and direct use with students and involves minimal preparation. Materials can also be adapted and extended. Each book explains how teaching strategies have been applied to a particular curriculum context, providing a rich source of teacher-to-teacher advice. Links to further resources and reading offer opportunities to challenge even the highest-attaining students.

The series also provides a template for writing new curriculum materials. Unit summaries, curriculum maps linked to geographical knowledge, processes and skills, assessment frameworks, glossaries, lesson plans and other materials are included as exemplars of rigorous curriculum planning. By using tools from the kit, we hope all teachers will gain the confidence to develop ideas and shape a curriculum to meet the needs and interests of their own students.

**Alan Kinder and John Widdowson, 2014.**

## WHY TEACH ABOUT RESOURCES?

With global population topping seven billion, an increasingly materialistic world is putting ever more pressure on finite resources. Globalisation means we have access to materials from all over the world, and commercial competition has ensured a steady supply of resources, at the lowest possible price, to wherever there is demand. Developing economies aspire to so-called Western lifestyles, and from food, water and energy to new homes, cars and consumer goods, we are using up the planet's resources at an unsustainable rate. Today's young people are facing a future in which the sustainability of some of these resources is in question.

This increasing demand for resources has created a complex global geography. Some resources are produced in ways that harm the workers involved or the environment; some will run out completely at current rates of consumption. Some countries will benefit from producing and selling resources, while others will experience a 'resource curse' as their natural wealth is

exploited to fund conflict or corruption. People in rich countries will continue to create a demand for luxuries, while people in poor countries will lack even basic necessities.

A key theme running through all the lessons in this Toolkit is the sustainable use of resources: students need to be aware of how supplying resources to meet demands can have negative impacts if not managed carefully. We want our students to develop a propensity to think about alternative futures and to envision the sort of world they want to grow up in, and the activities in these lessons can help structure that thought process.

In these geography lessons students will learn about how resources shape their world and where they fit into this story of resource use and exploitation. This will enable them to understand some of the biggest issues facing the world in the twenty-first century, and what needs to be done to resolve them.



Illustration: Dave Howarth.

## KS3 GEOGRAPHY TEACHERS' TOOLKIT

# HOW TO TEACH ABOUT RESOURCES



Photo © Magnus von Koeller.

*Without successful management, and an understanding of how sustainability can be achieved, it is possible young people will end up in a world of depleted resources and damaged environments.*

### Contemporary issues

Geography is a relevant and dynamic twenty-first century subject and should introduce students to contemporary issues and debates. If it does not, it becomes stagnant, boring and irrelevant to the lives of our young people. The case studies of resources in this Toolkit – for example, finite energy resources, overfishing tuna in the Indian Ocean, the exploitation of Sierra Leone's 'blood diamonds' – have all been selected with this in mind. Inevitably, however, they have been chosen to be generic and global in context, and teachers should look to ensure continued relevance by updating these case studies with other contemporary examples. Opportunities should be also sought to bring in local examples of resource sustainability to ensure a variety of scales.

### Promoting discussion

Contemporary issues are often complex, involving a variety of viewpoints. Discussion enables students to think through challenging ideas and there are many opportunities in this Toolkit to initiate a discussion or debate. This can be managed in a number of ways, from the more formal 'debate', where a student takes a side and produces a set of arguments, to the 'think-pair-share' idea, where students think about an issue before discussing it with their partners, then sharing it with a wider audience, e.g. the class.

### Understanding geographical processes

The thinking behind this *Toolkit* is that discussing issues in isolation is of limited educational value; students need opportunities to understand the processes that

underlie the issues properly understood without understanding an energy resource how it was created determine the availability, prominence, to establish a geographical picture.

### Independent

Students learn best. Most of the Activities give students an opportunity and to give them a developing concept to think through the role is to support.

### Encouraging

Students should be constantly challenged to substantiate their opinions on the This is critical to address the challenge and confidence.

### Summary

In a globalised world resources is increasingly unsustainable. Their exploitation economy or society and an understanding achieved, it is possible world of depleted.

### Prior learning

Key stage 3 is a At primary school with other subject knowledge by through geographical geographical the issues across present contemporary

underlie the issues. For example, it is impossible to properly understand the impacts of overfishing tuna without understanding a food web; to understand why an energy resource like oil is finite, you need to know how it was created. Thus, the physical processes which determine the availability of resources have been given prominence, to ensure that students can access the full geographical picture.

### Independent learning

Students learn best when they are actively engaged. Most of the Activity Sheets in this Toolkit are designed to give students an opportunity to think independently, and to give them a framework for constructing ideas and developing concepts. Students need time and space to think through these ideas on their own – the teacher's role is to support individuals and check progress.

### Encouraging critical engagement

Students should not learn passively. They should be constantly challenged, and asked for their thoughts and opinions on the issues raised. They should be prepared to substantiate their ideas with real examples and data. This is critical engagement, and will help young people address the challenges of a fast-changing world with confidence.

### Summary

In a globalised world with rising population, demand for resources is increasing. Some resources are being used unsustainably: either they will run out completely or their exploitation is harming the environment, the economy or society. Without successful management, and an understanding of how sustainability can be achieved, it is possible young people will end up in a world of depleted resources and damaged environment.

### Prior learning

Key stage 3 is an important time for young geographers. At primary school, geography is sometimes integrated with other subjects; now, they need to build on this knowledge by thinking about the world specifically through geography. The lessons in this *Toolkit* encourage geographical thinking, linking processes, ideas and issues across places with a critical understanding of contemporary events and an eye to potential futures.

### Future learning

Key stage 3 marks the end of compulsory geography, so it is important students have a solid grounding in the subject as well as an introduction to some big issues they will face in their everyday lives as they grow older. Some of the themes in these resources lessons introduce other topics, such as biodiversity, energy, and globalisation. This is intentional, so that those who do not continue with the subject at key stage 4 have a grounding in these concepts, and those who do continue get a taste of the topic and a foundation on which to build future knowledge. For those who do want to go on to GCSE, this Toolkit also develops the skills of extended writing, drawing diagrams and graphs, and interpreting maps and graphs.

### Key learning outcomes

Most students will be able to:

- define and classify types of resources
- effectively map countries where resources are produced around the world
- understand how the use of some resources can be unsustainable
- understand how use of some resources can cause conflict that requires management.

Some students will not have made so much progress and will be able to:

- recognise and define some resources
- locate on a map some countries where resources are produced
- understand that exploitation of resources can affect the economy, environment and people
- understand the concept of sustainability, and apply it to some resources.

Some students will have progressed further and will be able to:

- understand the physical and human processes that interact to enable a resource to be produced and efficiently utilised or consumed
- understand how the concept of sustainability can be applied to a variety of resources at various scales and that this can have a number of varying impacts (economic, social and environmental)
- understand how successful management can increase sustainability of resources, and how they can contribute to this process.

## Get up to speed on resources

A resource can be defined simply as something that we use. Every human on the planet needs resources in order to live. Some are essential, or vital, resources: food, water and energy; some are non-essential resources: they are not essential to life, but they either improve its quality, or are luxury items. This Toolkit enables students to engage with the complex geography of both essential (energy and food) and non-essential (diamonds) resources. Water, a vital resource for life, is covered well in the *Water Works* Toolkit (Watts, 2009).

A key theme running through the geography of resources is the notion of sustainability. This can be defined as our ability to meet our resource needs now, without affecting the ability of future generations to meet theirs. If a resource is being used up faster than nature can replace it, or if its use heavily pollutes the environment or causes wars and corruption, then it is said to be unsustainable.

## Energy: an essential resource

All humans require energy to power their homes. In the high-income world, and increasingly in the low-income world, this means using electricity, so how that electricity is produced is an important consideration for resource sustainability. Much electricity is produced by burning fossil fuels such as coal, oil and natural gas, which were formed in Earth over millions of years. Fossil fuels are a non-renewable resource: once they are gone they cannot be replaced, and as such their use is unsustainable. In the developed world, the use of fossil fuels began in earnest about 200 years ago, with the start of the Industrial Revolution. Demand for electricity is now increasing in the developing world and fossil fuels are being used up at a rapid rate. Some estimates suggest that the world has already reached 'peak oil' – the maximum rate of oil production – and from now on supplies will dwindle. Renewable resources, which rely on naturally recurring processes such as wind, tides and solar energy, or resources which can be replenished, such as biomass, are more sustainable sources of energy.

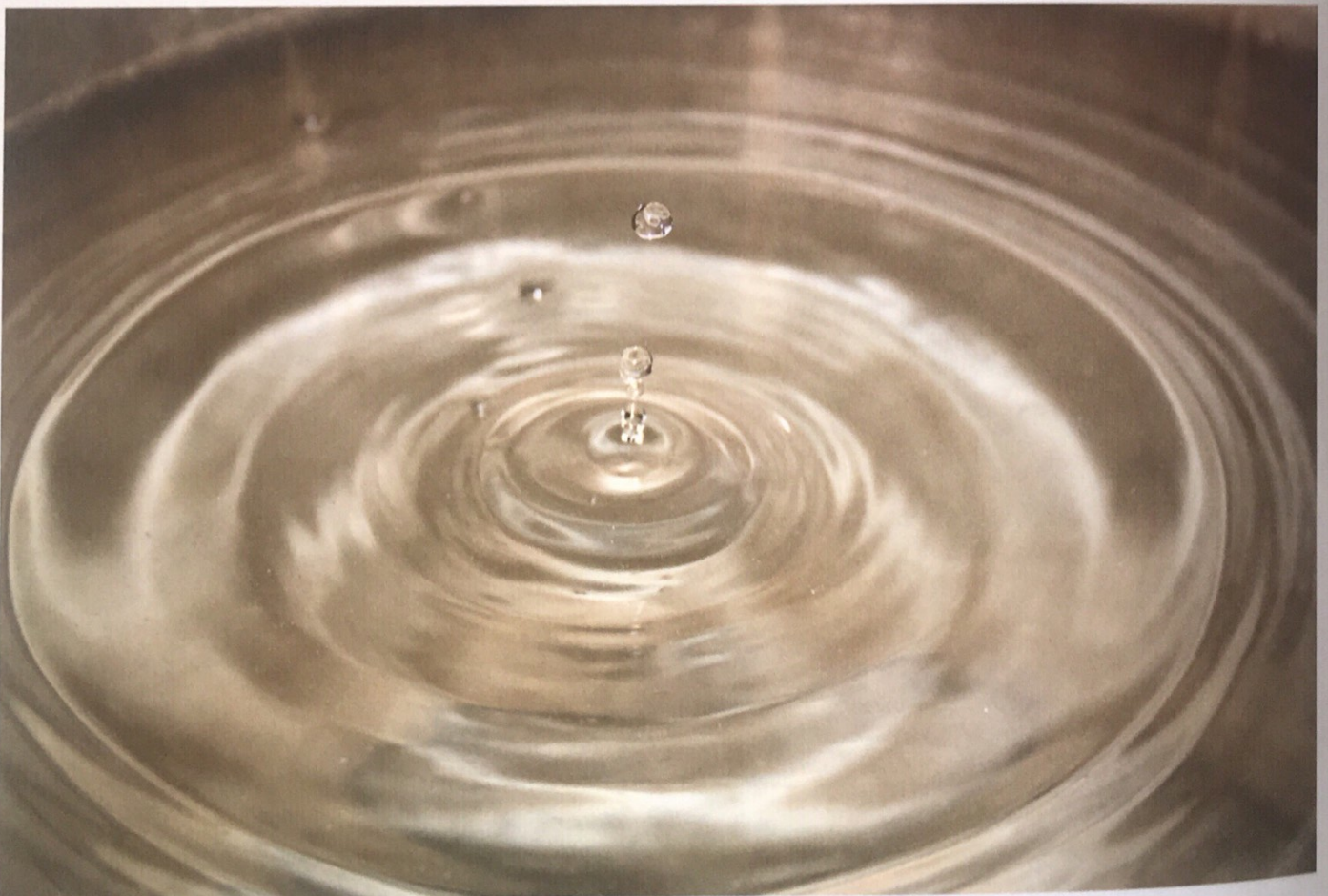


Photo © Kaushik Narasimhan.

*Debating resource futures will help students engage with the need for a sustainable future.*

Our current reliance on fossil fuels and the increasing demand for energy has created a world where those countries with plenty of natural energy resources are becoming increasingly rich and powerful. These countries are said to be 'energy secure' as they can meet all their domestic energy needs and have a surplus, which they can sell to other countries. Countries who cannot meet their own demand for energy are said to be 'energy insecure' and have to rely on other countries for energy. Russia is very energy secure, and sells its surplus energy to other countries. This has enhanced its 'superpower' status in the world, as some countries in Eastern Europe are entirely reliant on Russia for their energy. Since 2004 the UK has been reliant on imported energy, not because of an increase in consumption (in fact consumption has gone down), but due to dwindling domestic supplies as North Sea oil and gas runs out. As more countries move away from fossil fuels to develop more sustainable supplies, the geopolitics of energy is changing.

### **Food: an essential resource**

Food is another essential resource and, in a globalised world, we can get food from many countries, including fish from seas on the other side of the world. Tuna is one such fish, and much of the supply in British supermarkets originates from the Indian Ocean. Tuna is a very healthy food: it is a good source of protein and vitamin B and contains omega-3 fatty acid, which benefits the heart and blood pressure. Fish is recommended as part of a healthy balanced diet, but it is not necessarily a sustainable food source.

Fish produce large numbers of offspring, but the young are often eaten by other species before they get a chance to breed themselves. As long as fewer tuna are caught than those who survive to adulthood, tuna should be a sustainable resource. If more tuna are caught than survive to breed, tuna fishing can become unsustainable. Unfortunately, in the Indian Ocean competing transnational corporations involved in tuna fishing will not agree to limit the size of their fleets, so overfishing is occurring.

The unsustainable fishing of tuna also affects the marine ecosystem, as tuna is part of a larger food web. A change to one part of a food web can have a ripple effect

through the rest of the web. For example, removing large sharks, the top predator in the food chain, will lead to an increase in the number of small sharks and marlin. As their numbers increase, so does their need for food, so numbers of tuna and snapper might fall. Large ocean trawlers often catch other species, such as dolphins and sea turtles, in their nets ('bycatch'), reducing their numbers.

### **Diamonds: a non-essential resource**

Diamond is a naturally occurring mineral. It is very strong, and has a number of industrial uses, for instance as a cutting tool. Once cut and polished it is also very beautiful and so it is in great demand by the lucrative global luxury goods industry. However, the places where cut and polished diamonds are sold, and where the rough diamonds are mined, could not be more different, and this gives rise to diamonds' geographical interest.

Demand for diamonds is highest in rich countries, particularly the USA and Italy. In the emerging economies of China and India, affluent people aspire to a more western lifestyle, which explains the growing demand for diamonds in those countries. However, the markets for cut and polished diamonds are far distant from where natural forces formed the rough diamonds. Many of the sites of production are in low-income countries such as Sierra Leone. The presence of such high-value resources in Sierra Leone has created what some call a 'resource curse': poor working conditions for the miners and the suspicion of corruption amongst businessmen and government officials. Profits from Sierra Leone's diamond industry have been used to fund wars and so they are dubbed 'blood diamonds'. The situation in Sierra Leone is improving and safeguards have been put in place to prevent blood diamonds entering the world diamond market.

### **Resources and population in the 21st century**

Global population is rising. The increase is due to improvements in water quality and availability, food and sanitation, medicines and health care. The United Nations predicts a population of over nine billion by 2050; the highest rates of growth will be in the developing world, where children themselves are often seen as a resource. A large population means more



workers, and some governments encourage this. In the developed world, growth rates are stagnating and population is actually set to reduce. This is partly a consequence of more affluent lifestyles: having children is expensive, and a wide variety of goods and services compete for people's money. Also, as so many production methods are automated, fewer industrial workers are needed.

As to how the world will meet the resource needs of this increased population, two main theories dominate. The first, which derives from the eighteenth-century work of Thomas Malthus, is predicated on population rising beyond the availability of resources to support it: 'The power of population is indefinitely greater than the power in the world to produce subsistence for man... the superior power of population is repressed, and the actual population kept equal to the means of

subsistence, by modern-day terms carrying capacity. famine will bring it will even out at that the world, carrying capacity at or below it. population won

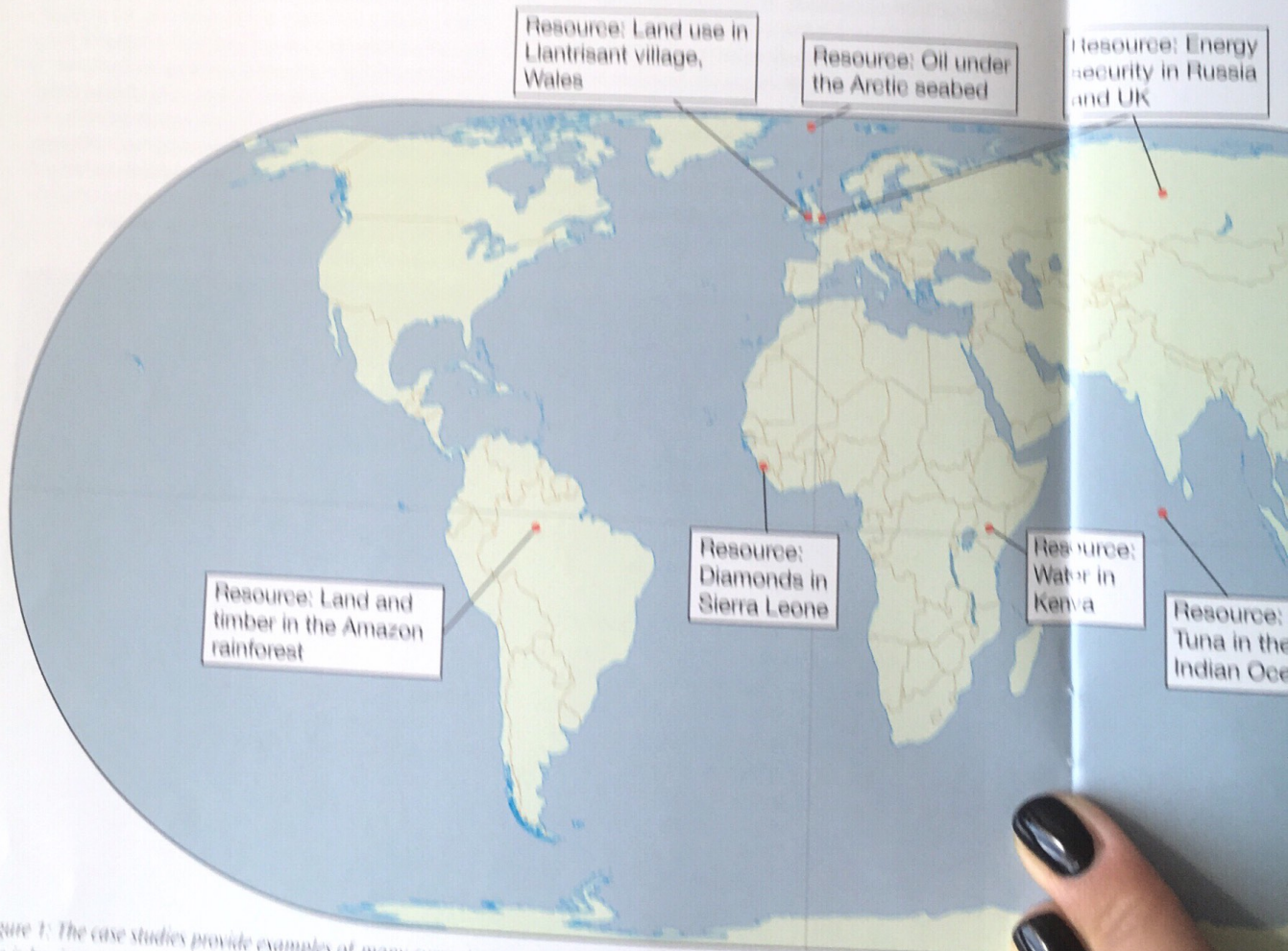
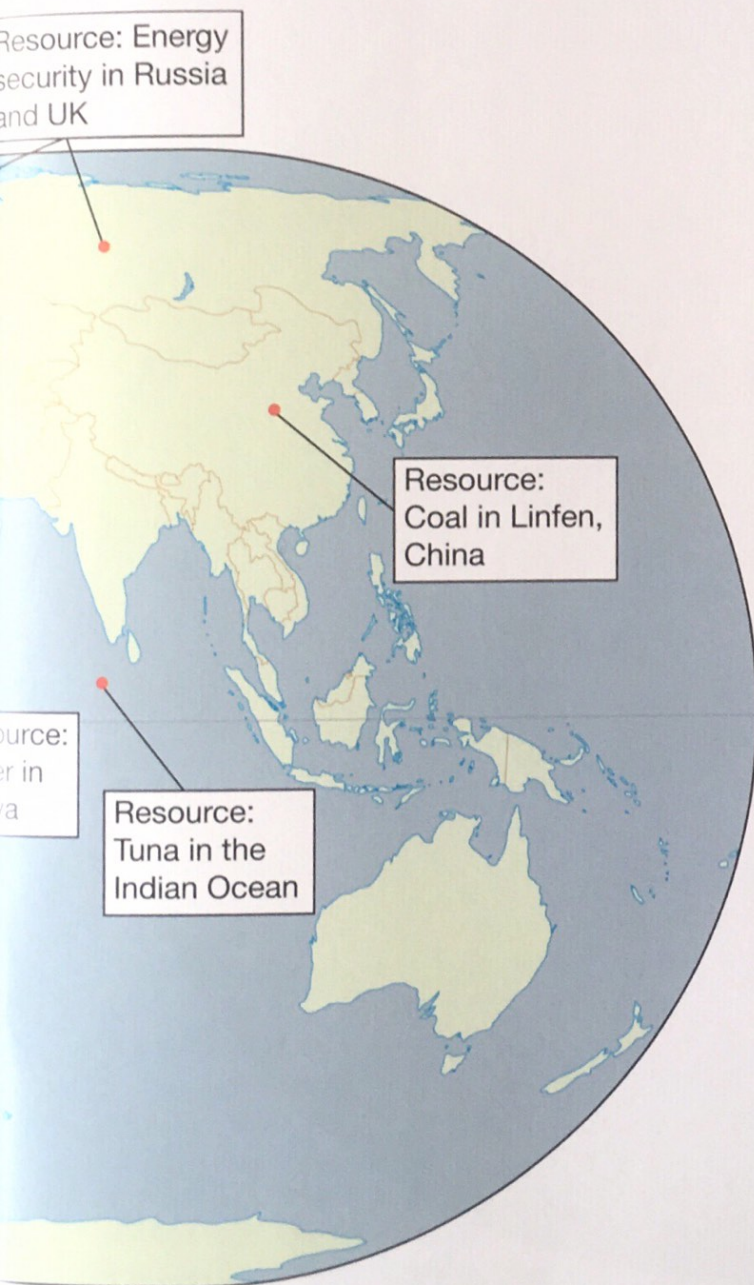


Figure 1: The case studies provide examples of many current resource issues and the impact that unsustainable resource use is having on the world.

subsistence, by misery and vice' (Malthus, 1798). In modern-day terms, if the population exceeds the carrying capacity of the land, disease, war, drought or famine will bring it back down; eventually, population will even out at the carrying capacity. This would suggest that the world, and regions within it, have a fixed carrying capacity, and global population should be kept at or below it. However, Malthus' prediction that population would outstrip resources has not happened.



Indeed, since his prediction the world's population has risen sevenfold to over seven billion. Could we yet approach a new natural limit of global population?

The second theory is predicated on carrying capacity being not fixed, but variable. As population nears its carrying capacity, technological advances increase the carrying capacity. This could mean finding new sources of food, improvements in food production methods, improving the quality of drinking water. Proponents of this theory point out that if we still lived as Stone Age hunter gatherers, we would have reached Earth's carrying capacity long ago. In this future, world population can rise and rise and we will never run out of resources.

Debating these two possible resource futures will help students engage with the need for a sustainable future. The case studies in this Toolkit (see Figure 1) provide examples of many current resource issues and the impact that unsustainable resource use is having on the environment and geopolitics of the world. Whether it is the disputed ownership of recently discovered oil under the Arctic Ocean; the continuing environmental impact of destroying the Amazon rainforest; or conflicting views about sustainable land use in a local town, a study of resources provides a rich opportunity for students to engage with some of the world's biggest issues, both globally and locally.

The issues covered in this Toolkit are very far from academic: today's students will most likely be living in a world of nine billion people. If today's leaders fail to deal with current resource issues, our students may have to deal with the consequences, so they need to understand the geography behind them. They also need to be able to think geographically, so they can apply their thinking to other sustainability issues and tackle them confidently.

## References

- Malthus, T. (1798) *An Essay on the Principle of Population*. London: J. Johnson.
- Watts, S. (2009) *Water Works: Do we have equal rights to resources?* Sheffield: Geographical Association.

# CONCEPTS AND CURRICULUM LINKS

In key stage 3 geography students should be taught locational knowledge, place knowledge, human and physical geography (including how human and physical processes interact on the environment) plus geographical skills and fieldwork.

As you might expect in a book about resources, there is are many links between human, environmental and physical geography. Creating a curriculum map (see Figure 2) helps to ensure we teach a broad and balanced curriculum.

We have used these areas of geography to create a curriculum map for this book. The map lists the key questions used as the basis of enquiry in all the lessons.

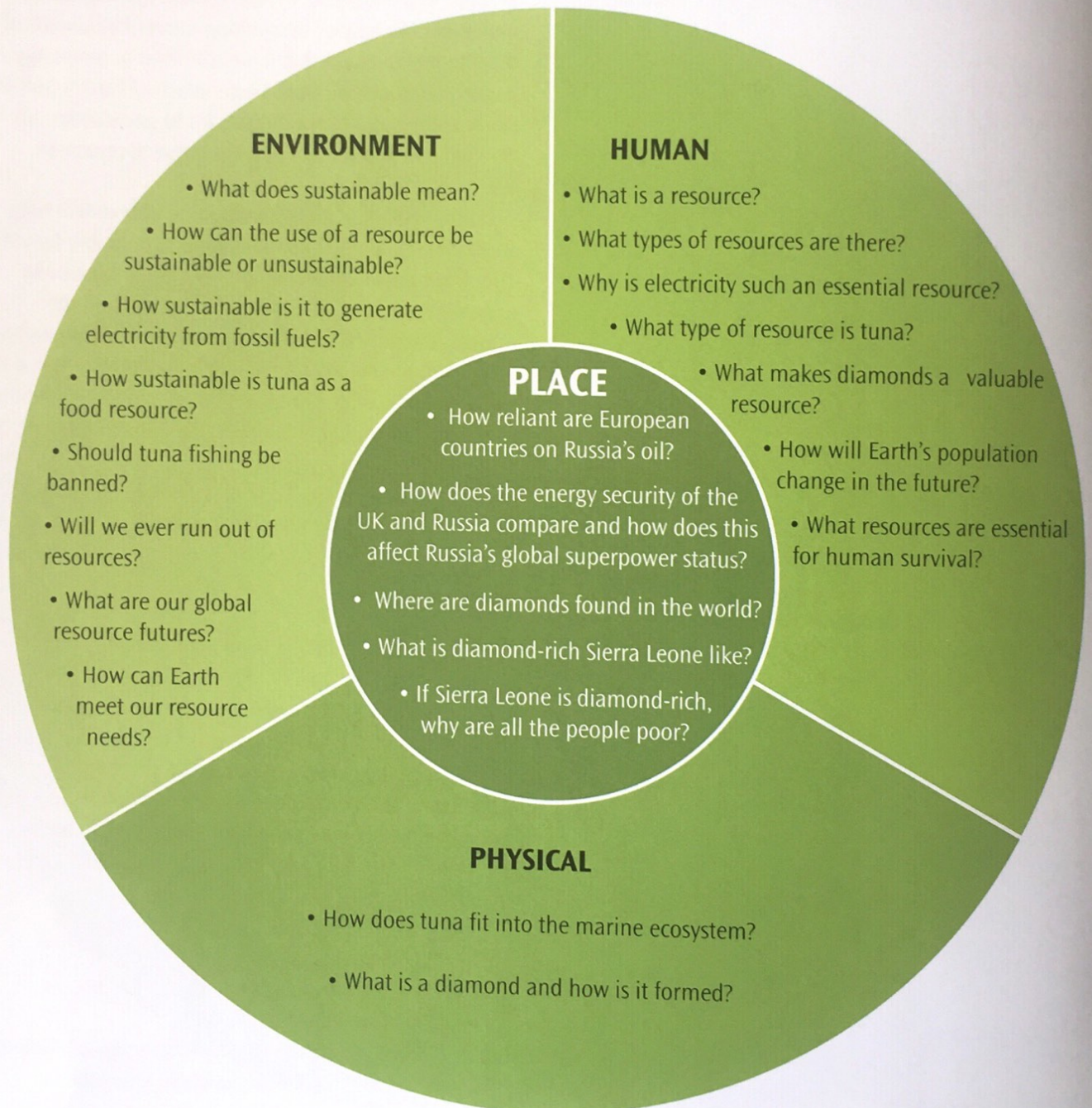


Figure 2: Plotting your broad and balanced geography curriculum in map form.

# Rising resource use threatens future growth, warns UN



The world is set to consume three times more natural resources than current rates by the middle of the century, according to a United Nations report.

It predicts that humanity will annually use about 140 billion tonnes of fossil fuels, minerals and ores by 2050.

Growth in population and prosperity are the main drivers, they observe.

The report is the latest in a series by the UN Environment Programme's (UNEP) International Resource Panel.

'Decoupling makes sense on all the economic, social and environmental dials,' said UNEP Executive Director Achim Steiner. 'People believe environmental "bads" are the price we must pay for economic "goods". However, we cannot and need not continue to act as if this trade-off is

inevitable.'

Co-lead author Mark Swilling from the University of Stellenbosch, South Africa, explained what would drive the surge in demand for resources. 'The reality is that there is another billion middle-class consumers on the way as a result of rapid industrialisation in developing countries,' he told BBC News. 'If the resources required to generate these goods and services are used as efficiently as they currently are, then you are looking at that massive growth to 140 billion tonnes.'

The projection is based on data on four key resources: minerals, ores, fossil fuels and biomass. Global average annual per capita consumption in 2000 was 8-10 tonnes, about twice as much as in 1900, the report said.

The combination of population

*The combination of population growth, high levels of consumption, and increased demand for material goods saw total resource use grow eight-fold in the 20th century. Photo © Joe Dunckley.*

growth, continuing high levels of consumption in industrialised countries, and increased demand for material goods – particularly in nations such as China, India and Brazil – saw total resource use grow eight-fold in the 20th century.

Decoupling of economic growth and resource consumption is occurring, the authors observe, but not quickly enough. They describe China as a test case 'because it wants to continue its rapid economic growth, but use resources more sustainably'.

*Source: BBC News, 12 May 2011.*

# MEDIUM-TERM PLAN

Lesson	Key questions	Learning objectives	Teaching and learning	Resources	Assessment opportunities
1. The stuff we use!	What is a resource?	To know what a resource is	<b>Starter:</b> Students identify link between images of resources	Activity Sheets 1 and 2	Justification of categorisations
	What types of resources are there?	To understand different types of resources, and the differences between them	<b>Main:</b> Students complete different categorisations of resource types, justifying their choices each time. They match definitions and answer questions  <b>Plenary:</b> Using key words, students answer question 'Why do geographers want to study resources?'	Photo Set 1	Definitions-based questions  Two-sentence conclusion
2. Resources forever	What does sustainable mean?	To know what sustainability is	<b>Starter:</b> Whole-class discussion to introduce sustainability	Activity Sheets 3 and 4	Research skills, identifying and categorising information
	How can the use of a resource be sustainable or unsustainable?	To understand what aspects of resource use are sustainable or unsustainable	<b>Main:</b> Students undertake independent research into contemporary resource issues to feed back to class. They complete a summary table  <b>Plenary:</b> Students rank each issue for sustainability and discuss their findings	Information Sheets 1-5 Highlighter pens An atlas for each student	Peer-to-peer teaching  Mapping
3. Power to the people	Why is electricity such an essential resource?	To know why electricity is such an essential resource	<b>Starter:</b> Whole-class discussion: Why is electricity important?	Activity Sheets 5 and 6	Diagram and explanation completion
	How sustainable is it to generate electricity from fossil fuels?	To understand how electricity is generated from oil  To assess how sustainable this process is and if there are alternatives	<b>Main:</b> Working in pairs, students complete diagrams of electricity generation from oil  <b>Plenary and homework:</b> Students discuss alternative ways to generate electricity, research one of these ways and draw diagrams	Information Sheets 6 and 7	Independent research skills from homework task
4. Black gold: Russia's oil	How reliant are European countries on Russia's oil?	To understand the changing patterns of energy production and consumption in the UK and Russia	<b>Starter:</b> Students identify key trends from energy data for the UK and Russia	Activity Sheets 7 and 8	Flow line map of Russian oil
	How does the energy security of the UK and	To construct a flow line map	<b>Main:</b> Students identify countries reliant on Russian oil and complete a flow line map showing Russian oil flow to Europe	Information Sheets 8 and 9 An atlas for each student	

Lesson	Key questions
	Russia compare and how does this affect Russia's global superpower status?
5. Something fishy going on	What type of resource is tuna?  How does tuna fit into the marine ecosystem?
6. A net result	How sustainable is tuna as a food resource?  Should tuna fishing be banned?

Lesson	Key questions	Learning objectives	Teaching and learning	Resources	Assessment opportunities
	Russia compare and how does this affect Russia's global superpower status?	To recognise the link between energy security, development and superpower status	<b>Plenary:</b> Students compare the energy security of the UK and Russia and discuss superpower status		
<b>5. Something fishy going on</b>	What type of resource is tuna?  How does tuna fit into the marine ecosystem?	To classify tuna as a resource  To understand how tuna fits into the marine food web and how it can be affected by changes to the ecosystem  To consider the ownership of ocean resources and how they should be shared	<b>Starter:</b> Whole-class discussion: Is tuna a renewable or non-renewable resource?  <b>Main:</b> Students complete food web interpretation and answer questions. They map Indian Ocean countries and answer questions  <b>Plenary:</b> Whole-class discussion – who owns the fish in the sea?	Activity Sheets 9 and 10  Photo Set 2  Atlases  Can of tuna	Food web questions  Accuracy of map and question answering
<b>6. A net result</b>	How sustainable is tuna as a food resource?  Should tuna fishing be banned?	To understand what makes fishing sustainable  To acknowledge that there are a range of opinions about the tuna industry  To consider their own response to the issue of unsustainable tuna fishing	<b>Starter:</b> Students are introduced to the concept of overfishing  <b>Main:</b> Students watch video clip, or undertake internet research, and answer questions. They undertake a talking heads exercise to assess whether tuna fishing should be banned. They compose an email to one of the characters from the talking heads exercise, supporting or arguing against their opinion  <b>Plenary and homework:</b> Students decide for themselves if tuna fishing should be banned and hold a class vote. They investigate fish farming as an answer to the problem of overfishing	Activity Sheets 11–13  7-minute clip from the BBC's 'Indian Ocean with Simon Reeve' (available from iTunes for nominal fee), or internet access	Written responses to 'Should tuna fishing be banned?'  Email to one of the characters on Activity Sheet 12

KS3 GEOGRAPHY TEACHERS' TOOLKIT  
MEDIUM-TERM PLAN

Lesson	Key questions	Learning objectives	Teaching and learning	Resources	Assessment opportunities
7. Diamonds are forever?	<p>What is a diamond and how is it formed?</p> <p>What makes diamonds a valuable resource?</p> <p>Where are diamonds found in the world?</p>	<p>To know how diamonds are formed and where they are produced and consumed</p> <p>To understand why there is a difference between the sites of production and consumption</p>	<p><b>Starter:</b> Diamond memory exercise</p> <p><b>Main:</b> Students perfect their diamond formation diagrams. They discuss why diamonds are valuable and describe global distributions of diamond production and consumption</p> <p><b>Plenary and homework:</b> Students create a spider diagram with reasons explaining diamond distribution and consumption. Students use creative writing to tell the story of a diamond from formation to consumption</p>	<p>Activity Sheet 14</p> <p>Information Sheet 10</p> <p>Photo Set 3</p>	<p>Quality of diagrams drawn from memory</p> <p>Map descriptions and explanations</p> <p>Creative writing</p>
8. Sierra Leone's resource curse	<p>What is diamond-rich Sierra Leone like?</p> <p>If Sierra Leone is diamond rich, why are all the people poor?</p>	<p>To know the location of Sierra Leone and surrounding countries</p> <p>To use data to compare development in Sierra Leone and the UK and to recognise the differences</p> <p>To understand why diamonds are a resource curse for Sierra Leone</p>	<p><b>Starter:</b> Students imagine what Sierra Leone is like as a resource-rich country and compare this with the reality</p> <p><b>Main:</b> Students complete a map of West Africa and a data search for comparing Sierra Leone to UK. They undertake a group information-finding challenge about why diamonds are a resource curse</p> <p><b>Plenary and homework:</b> Students share answers to the key question. They create a piece of extended writing that explains why Sierra Leone's people are poor</p>	<p>Activity Sheets 15 and 16</p> <p>Information Sheets 11 and 12</p> <p>Photo Set 4</p> <p>An atlas for each student</p>	<p>Mapping and data finding exercise</p> <p>Extended writing</p>
9. Made to last?	<p>What resources are essential for human survival?</p> <p>How will Earth's population change in the future?</p> <p>Will we ever run out of resources?</p>	<p>To know what resources are vital for human survival</p> <p>To produce and interpret a graph of population growth</p> <p>To understand two possible resource futures and be able to critically engage with each</p>	<p><b>Starter:</b> In pairs, students discuss what resources are essential and which of these are unsustainable</p> <p><b>Main:</b> Students draw a graph of population levels. They explain possible population futures and add explanation to graphs. They look at two models of carrying capacity and debate if Earth will one day run out of resources</p> <p><b>Plenary:</b> Students come up with their own answer as to the likely possible future for resources</p>	<p>Activity Sheets 17 and 18</p> <p>Information Sheet 13</p>	<p>Graph drawing</p> <p>Graph annotation</p> <p>Extended writing</p>

Lesson	Key questions	Learning objectives	Teaching and learning	Resources	Assessment opportunities
10. <b>Costing the Earth?</b>	<p>What are our global resource futures?</p> <p>How can Earth meet our resource needs?</p>	<p>To appreciate there are different possible resource futures</p> <p>To use their understanding to predict future changes to resource sustainability</p>	<p><b>Starter:</b> Students imagine their futures and revisit the concept of sustainability</p> <p><b>Main:</b> Students undertake a futures exercise to describe sustainable and unsustainable futures for resources covered in previous lessons</p> <p><b>Plenary:</b> Students devise an action plan to achieve a sustainable future for resources</p>	Activity Sheet 19	<p>Completion of Activity Sheet 19</p> <p>Action plan bullet points</p>



## LESSON 1:

## The stuff we use!

**Key questions**

- What is a resource?
- What types of resources are there?

**Learning objectives**

- To know what a resource is
- To understand different types of resources, and the differences between them

**Key words**

- consumption
- deficit
- essential resource
- non-essential resource
- non-renewable/finite
- renewable/infinite
- resource insecurity
- resource security
- surplus

**Resources**

- Activity Sheet 1: Resource categories
- Activity Sheet 2: Key words: meanings and questions
- Photo Set 1: Resources

**Assessment opportunities**

- Can students classify the resources and justify their classifications?
- Can students match up the words and meanings and answer the definitions-based questions, using the vocabulary appropriately?

**Starter**

Ask students to observe a set of images (Photo Set 1) and identify the geography they think the images show. Give them 20 seconds to observe each image, then a further 10 seconds to write down what geography they think it shows. At this stage, do not mention that they are looking at images of resources. After each image, invite the students to share their thoughts before moving on to the next. At the end of the image sequence discuss as a whole class what ties all the images together.

**Main teaching phase**

Introduce the idea of a resource to students and hand out Activity Sheet 1. They need to work in pairs to categorise the resources in the first column of the table – those that are essential for life and those that are non-essential for life. Once all the resources are categorised, students need to be able to justify their classifications. After a good enough justification has been given, they move on to categorise the resources again in the second column – natural and artificial. Each time they should justify their choices and then complete the next categorisation until the table is completed. In the last column students order the resources as to their value, 1 being most important and 24 least important.

Once students have had a chance to think about different resources, hand out Activity Sheet 2 and ask them to work in pairs to match up each word with its meaning. The first few are already done, and they should use these to help work out the rest. Once complete, and correct, there are questions at the bottom of the sheet to answer in their books. They will only be able to answer these questions if they have read the definitions carefully, so briefly review the questions to ensure the students have understood them.

**Plenary**

Lead a quick class discussion by asking the students 'Why do geographers want to study resources?' Get them to answer this question by choosing any two of the words from the list and writing a sentence containing these words. Ask some students to read their sentences out.

**Teaching tips** 

The learning here depends on the quality of the discussion, as there will be resources that are difficult to classify. Being able to think, classify, argue and justify in pairs is a key learning tool.

Getting the students to understand why a topic is important is a useful way to start any course of study, as it helps them to see the relevance of the lessons to the real world. This in turn should enhance their motivation.



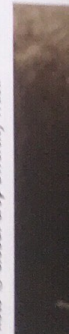
1 The Chilean car.



2 Com



3 Logg



4 Wh

Photo © Magnus von Koeller.



1

1 The world's largest open-pit copper mine, Chuquicamata, Chile. Note the size of the trucks compared to the size of the car.



5

5 Water well.

Photo © ellenm1.

Photo © Nick Rahaim.



2

2 Commercial cod fishing.



6

6 Underground mine producing materials for cement.

Photo © Matthiasshn.

Photo © Scott Thompson, World Resources Institute.



3

3 Logging of rainforest trees in Congo.



7

7 Oil rigs, Huntington.

Photo © adddee.

Photo © Global Crop Diversity Trust.



4

4 Wheat field in Albania growing food for the world market.



8

8 Electricity pylons in Egypt.

Photo © Paul Robinson.

## LESSON 2: Resources forever

### Key questions

- What does sustainable mean?
- How can the use of a resource be sustainable or unsustainable?

### Learning objectives

- To know what sustainability is
- To understand what aspects of resource use are sustainable or unsustainable

### Key words

- sustainability

### Resources

- Activity Sheet 3: Sustainability summary table
- Activity Sheet 4: Blank world map
- Information Sheet 1: The Amazon rainforest – timber
- Information Sheet 2: The Arctic Ocean – oil and gas
- Information Sheet 3: Kenya – water
- Information Sheet 4: Linfen, China – coal
- Information Sheet 5: Llantrisant, Wales – land
- Highlighter pens
- An atlas for each student

### Assessment opportunities

- Research skills, identifying and categorising information
- Peer to peer teaching
- Mapping

### Starter

Introduce students to the concept of sustainability. Ask them what the word 'sustain' means and link it to the idea of 'stay the same'. There are many ways of illustrating this. One way would be to get students to think about what it means to sustain their interest in their geography lessons. What would happen if they used up all their interest concentrating for the first two minutes? They would have nothing left for the rest of the whole lesson: that would be unsustainable! To be sustainable, their interest would need to last for the whole lesson.

Now introduce the concept of sustainability in relation to resources. Ask them what a finite resource is. They were introduced to this term last lesson. Why might the use of a finite resource be unsustainable? Can they give any examples?



Timber from the Amazon Rainforest.



Oil drilling in the Arctic.



Photo © DjiD.

Water shortages



Photo © DaiLuo

Industrial pollution



Photo © Kevin Arscott.

Land wanted for

### Main text

The purpose of... with real world... about sustaina... some of the w...

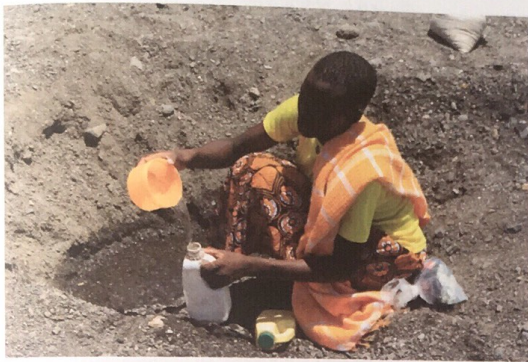


Photo © DJFD.

*Water shortages in western Kenya.*



Photo © Dai Luo.

*Industrial pollution in China.*



Photo © Kevin Arscott.

*Land wanted for housing in Llantrisant, Wales.*

### Main teaching phase

The purpose of this exercise is to help students engage with real world resource issues and get them thinking about sustainability in real contexts. It offers examples of some of the world's biggest resource issues.

Divide the class into five small groups, or ten sets of pairs. Each group will need four highlighter pens or pencils, one of the Information Sheets (1 to 5) and a copy of Activity Sheet 3 for each student. Each sheet contains information about a resource somewhere in the world. You could substitute Information Sheet 5 with an example of a local resource issue. Students should read the Information Sheet and highlight information using one colour to identify the resource, a second colour to identify what type of resource it is (energy, food, essential, etc), a third colour to identify any problems associated with that resource and a fourth colour to identify ways in which the problems can be resolved or managed. Groups who finish could be asked their opinion on the resource and how its future might play out.

As a whole class, the groups then report their findings and each student completes their summary table on Activity Sheet 3. Depending on group size or class size, this activity could be led from the front with a spokesperson from each group or by pairs of students standing up and talking to the class.

### Plenary

Once all the summary tables are complete, the students could score the examples 1 to 5, from most to least sustainable, and compare their scores with their neighbour. This can then be discussed as a class.

### Extension or possible homework

The students have been introduced to a lot of places in this lesson so it is important they understand where these are. Each student needs Activity Sheet 4 and an atlas. They should locate all the examples studied.

### Teaching tips

Keeping a world map in the front of their exercise books is a great way to develop students' knowledge of places. Each time a new place is encountered in a geography lesson, time should be taken to locate it and add it to the base map.

Using an issue that will be familiar to the students will help them see its relevance to them, and become aware of the geography in their own neighbourhoods.

## LESSON 3: Power to the people

### Key questions

- Why is electricity such an essential resource?
- How sustainable is it to generate electricity from fossil fuels?

### Learning objectives

- To know why energy is such an essential resource
- To understand how electricity is generated from oil
- To assess how sustainable this process is and if there are alternatives

### Key words

- dynamo
- fossil fuel
- oil
- power station
- electricity generation
- impermeable rock
- oil rig

### Resources

- Activity Sheet 5: Energy from oil – diagram grid
- Activity Sheet 6: How else can we generate electricity?
- Information Sheet 6: How do we get energy from oil?
- Information Sheet 7: Energy from oil – diagrams

### Assessment opportunities

- Diagram and explanation completion
- Independent research skills from homework task

### Starter

Get pairs of students to think about the questions 'what is energy?' and 'what sorts of energy do we use?' They should feed their ideas back to the class. There should be a range of ideas here, some of which might relate to work covered in science lessons. If it did not emerge in the initial discussion, introduce the idea of electricity, and get them to think in pairs again about what they use electricity for in their everyday lives. Get them to close their eyes and imagine their world without electricity: how different would their lives be? Get them to think about who else might use electricity, for instance businesses and industries.

Students should try to capture some of this discussion by writing two sentences answering the question 'Why is energy such a vital resource?' They can share this with the class.

### Main teaching phase

Ask the students where electricity comes from. Depending on what they have covered in science lessons, they may already know, but they need to understand it in a geographical context. The example here is generating energy from oil. They should work in pairs. One of the pair needs the script (Information Sheet 6) and the other needs the diagram grid (Activity Sheet 5). The person with the script reads the first three stages to their partner, who has to draw a diagram to represent what is happening in each stage. After three stages they should swap over. When they have drawn six diagrams between them, ask them to add key words and phrases to their diagrams, using the scripts to help. Then they can compare their diagrams with the examples on Information Sheet 7.

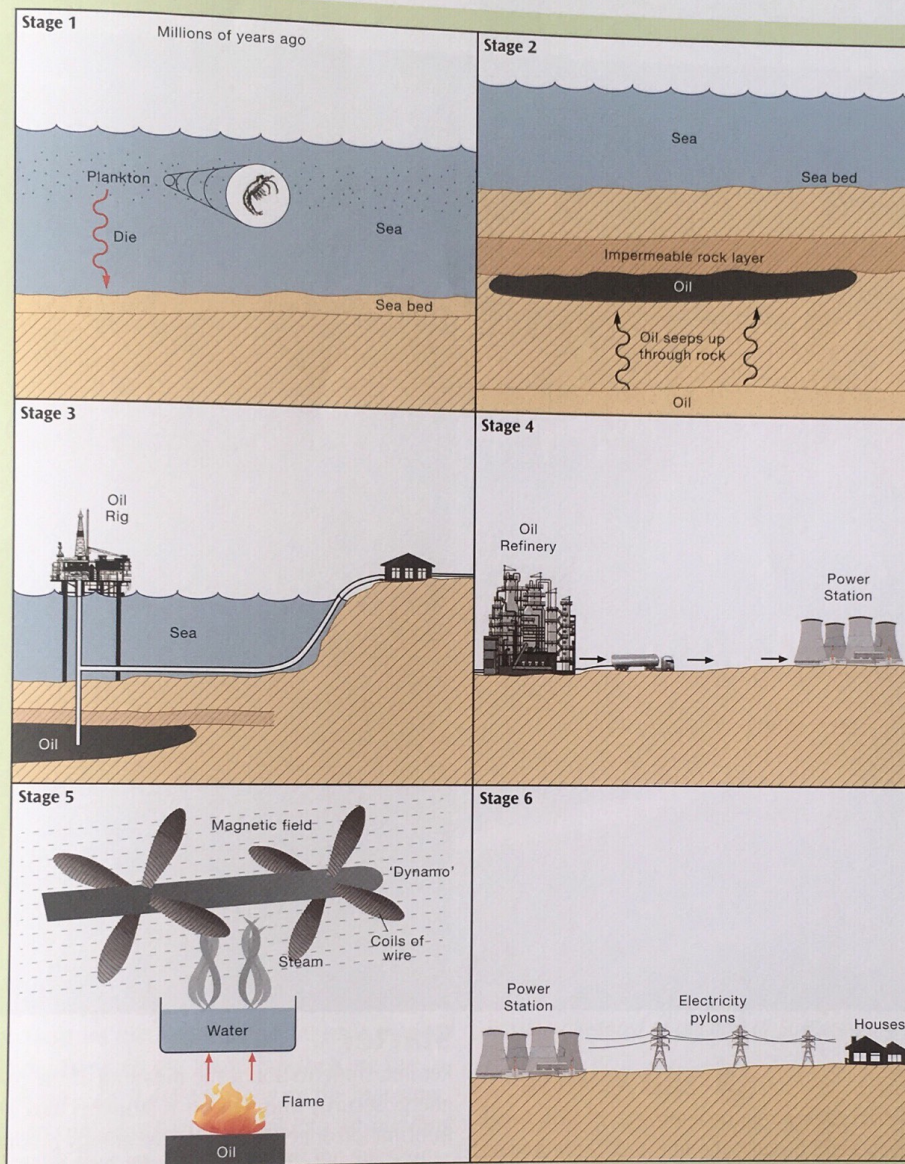
Referring back to the discussion of finite resources, get the students to write down whether or not they think this process (generating electricity from fossil fuel) is sustainable. If so, why? If not, why not? Some students may refer to the effects of an oil spill on the environment.

### Plenary

How else could electricity be generated? Get students to think in pairs about any other ways that electricity could be generated. All that is really needed is the power to turn a dynamo: what else could provide that power? Get them to think about anything in nature that flows that could turn something around. Share the ideas with the class. Hopefully, they will have come up with wind, rivers, waves or geothermal power, and perhaps some creative ideas of their own. Reveal a map showing the location and type of power stations in the UK, using [http://news.bbc.co.uk/1/shared/bsp/hi/pdfs/14\\_06\\_06\\_powerstations.pdf](http://news.bbc.co.uk/1/shared/bsp/hi/pdfs/14_06_06_powerstations.pdf) or similar. Does anything about this information surprise the students?

### Homework

Based on the map shown in the plenary, students should research one of the alternative ways of generating electricity. They are to research, then draw, a labelled set of diagrams similar to those created in class and include reference to the locations of this type of power station. Activity Sheet 6 gives some useful guidance, but they



should do this work independently. If each student researches a different type of alternative energy these could be presented to the rest of the class at a later stage as an extension to the topic.

### Teaching tips

Students should be able to take ownership of their research. They should know where to go for information and be able to identify and confidently use reliable

sources of information. These independent learning skills take time to develop but should be introduced at key stage 3.

Drawing clear diagrams is an important communication skill in geography. Diagrams should be simple, and must have a set of labels and a key. It should also be clear what type of diagram they are – a cross section, an aerial view or a 3D 'block' diagram.

## LESSON 4: Black gold: Russia's oil

### Key questions

- How reliant are European countries on Russia's oil?
- How does the energy security of the UK and Russia compare and how does this affect Russia's global superpower status?

### Learning objectives

- To understand the changing patterns of energy production and consumption in the UK and Russia
- To construct a flow line map
- To recognise the link between energy security, development and superpower status

### Key words

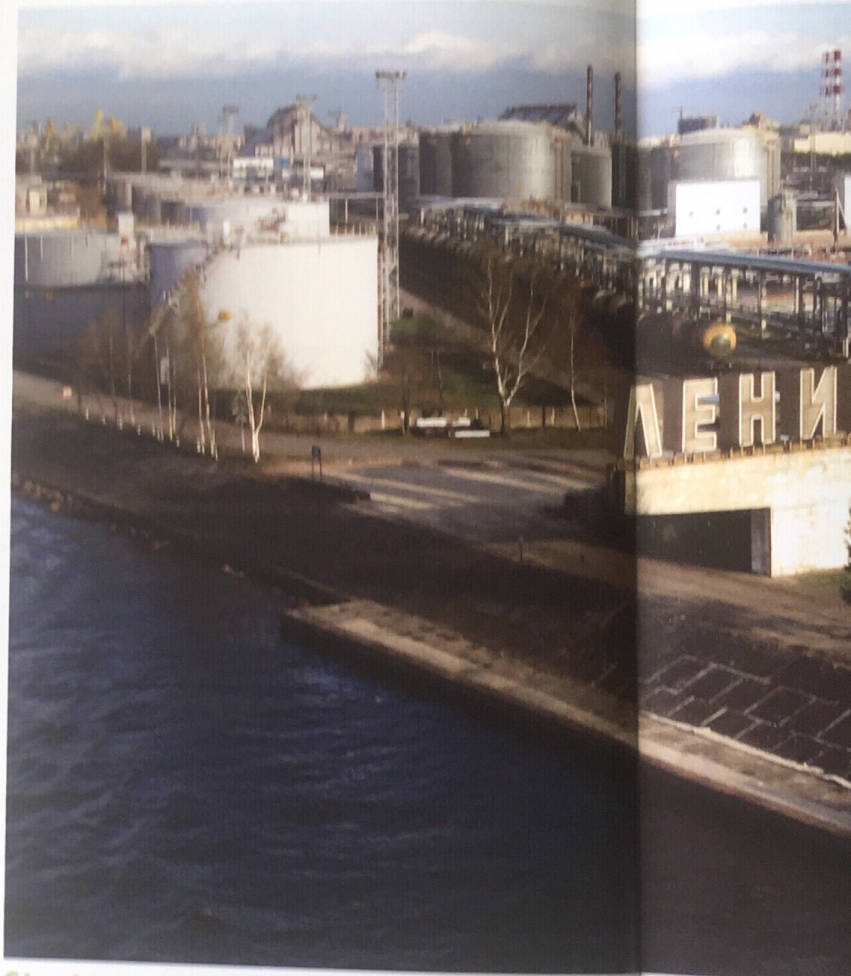
- energy security
- superpower

### Resources

- Activity Sheet 7: Flow line map of Russian oil exports
- Activity Sheet 8: Russia's oil exports
- Information Sheet 8: Energy data for the UK and Russia
- Information Sheet 9: Russia's oil surplus
- An atlas for each student

### Assessment opportunities

- Flow line map of Russian oil



### Starter

Remind students about the meaning of the phrase energy security from Lesson 1. Students look at Information Sheet 8, the relative energy production and consumption for the UK and Russia. Working in pairs, they identify key trends for each of the graphs. Students should be able to identify changes in production and consumption and the difference between production and consumption. Each pair should share their ideas with the class.

### Main teaching phase

Each student needs an atlas, Information Sheet 9 and Activity Sheets 7 and 8. Using the atlas, students should

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### Plenary

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Photo © J. Elliott

Russian oil stored at the port of St Petersburg

Identify the countries that are 100% reliant on Russian oil and then colour these on the map. They then use the data from Information Sheet 9 to draw on the map flow lines of Russian company Gazprom's oil into surrounding countries. Finally, students should answer the questions on Activity Sheet 8.

### Plenary

Review the questions, then as a class discuss 'How does the energy security of UK and Russia compare?' This could be extended to think about global superpowers. Do they think the UK is a superpower? If so, why? If not, why not? Is this a problem?

### Teaching tips

Being able to interpret complex graphs is an important geographical skill. Students should focus on the title, understanding each axis, noticing trends and unusual patterns, and differentiating between actual and predicted data.

Flow line construction is a way of showing movement on a map. The thickness of each arrow should be to scale according to its value. For younger or lower ability groups, arrows can be a standard size; or you could reduce the number they have to draw.



## LESSON 5: Something fishy going on

### Key questions

- What type of resource is tuna?
- How does tuna fit into the marine ecosystem?

### Learning objectives

- To classify tuna as a resource
- To understand how tuna fits into the marine food web and how it can be affected by changes to the ecosystem
- To consider the ownership of ocean resources and how they should be shared

### Key words

- ecosystem
- food chain
- food web
- predator

### Resources

- Activity Sheet 9: Marine ecosystem food web
- Activity Sheet 10: Map of the Indian Ocean
- Photo Set 2: Tuna fish
- Atlases
- Can of tuna

### Assessment opportunities

- Food web questions
- Accuracy of map and question answering

### Starter

Hand around a can of tuna fish – choose one that requires a can-opener rather than one with a ring-pull to avoid unwanted mess! Ask the students 'Where has it come from?' and 'What sort of resource is it?' Then show the pictures of tuna from Photo Set 2. Do any of the images help to answer the questions? If so, how?

Give the students two minutes to discuss in pairs whether they think tuna is a renewable and/or sustainable resource then give feedback to the whole class. This should generate a good deal of debate.



*A valuable food resource, the depletion of tuna has wide-ranging implications for the whole marine ecosystem.*

### Main tea

Give students a version of the m how tuna fits in familiar with th if not, these will

Once students a they can answer will encourage t the whole food ecosystem. You the short food c

turtle; e.g. what would happen if sea turtles were removed? They need to answer these questions fully, giving reasons for the implications they have identified.

Once all students have had a chance to answer the questions, get them to swap their answers with the person next to them and peer mark each other's work.

Now give each student Activity Sheet 10, which asks them to label all the countries that border the Indian Ocean. Students should use an atlas for this task, then answer the questions on the sheet before a brief class review.

## Plenary

Class discussion: Who owns the fish in the sea? Put this title up on the board and get students to consider it. They should discuss their ideas with their partner before sharing them with the rest of the class. Are fish a global resource, owned by the whole of humanity, or are they owned by the countries near to where they swim? Or are they not owned by anyone at all? This is an important question to consider when learning about food resources, and some interesting ideas can result from these discussions.

## Teaching tips

Using a real life prop, such as a can of tuna, can be really engaging. If your class will respond well, it could be opened for all to see, touch and smell!

With peer marking, the key is for students to give marks for logical explanations, even if the ideas are different from the ones they came up with themselves. They should write a formative comment on their peer's work to help them to improve.

## LESSON 6:

### A net result

#### Key questions

- How sustainable is tuna as a food resource?
- Should tuna fishing be banned?

#### Learning objectives

- To understand what makes fishing sustainable
- To acknowledge that there are a range of opinions about the tuna industry
- To consider their own response to the issue of unsustainable tuna fishing

#### Key words

- bycatch
- commercial fishing
- overfishing
- pole and line fishing

#### Resources

- Activity Sheet 11: The Indian Ocean – questions
- Activity Sheet 12: Should tuna fishing be banned?
- Activity Sheet 13: Tuna fishing research homework
- 7-minute clip from the BBC's 'Indian Ocean with Simon Reeve': 43:30-50:37 'Oman to Maldives' (available from iTunes for a nominal fee), or internet access for students' own research

#### Assessment opportunities

- Written responses to 'Should tuna fishing be banned?'
- Email to one of the characters on Activity Sheet 12

#### Starter

Write the question 'What is overfishing?' on the board and get the students to write the answer, using some of the ideas from the previous lesson. They must incorporate the key word 'unsustainable' and give an example in their answer. Students should compare their response with those of at least two other people in the class, not including the person they usually sit next to. Once compared, they can amend or change their answer. The best ones can then be shared with the class.

#### Main teaching phase

If available, show students the clip from Simon Reeve's *Indian Ocean* television series. The clip starts with him in the Maldives Islands. First, students should locate these on their map of the Indian Ocean from the last lesson. While you show them the clip, ask students to answer the questions on Activity Sheet 11: this will focus their thoughts as they watch. Their answers will help them compare trawler fishing with pole and line fishing. What are the main differences? Then they complete the table on Activity Sheet 11. Their ideas can be shared with the class.

If you do not wish to use the video clip, you could instead provide students with a copy of Activity Sheet 11 and ask them to research fishing in the Maldives in order to answer the questions. Their ideas can then be shared with the class.

Each student then needs a copy of Activity Sheet 12; a talking heads exercise. They read the statements from each of the six people involved in the global tuna fishing industry then use the points made in each of the statements to complete the table, giving reasons why tuna fishing should be banned, and reasons why it should not.

Each student chooses one of the people in the talking heads exercise and drafts an email to them, either supporting them and empathising with their plight, or arguing against them. As much as possible, they need to use real data and information to support what they say.



Photo © Prigalla.

*How tuna are fished is key to how sustainable or unsustainable the resource use is.*

## Plenary

Students come up with their own answer to the question 'should tuna fishing be banned?' Ask a few students to read their answers out then vote as a class.

## Homework

Is fish farming the way forward? Using Activity Sheet 13, students research developments in tuna farming and produce a one-page fact sheet on what it is trying to achieve and how it does it.

## Teaching tips

Videos are a great way to help students engage with a particular issue. The video should be paused at various stages and students given an opportunity to reflect on the footage. An exploration of bias could also come in here: does the video make you feel a particular way about an issue and if so, how?

Developing empathy with people or characters can help students to engage with a complex issue. Talking heads can offer a range of opinions and promote empathy.

## LESSON 7: Diamonds are forever?

### Key questions

- What is a diamond and how is it formed?
- What makes diamonds a valuable resource?
- Where are diamonds found in the world?

### Learning objectives

- To know how diamonds are formed and where they are produced and consumed
- To understand why there is a difference between the sites of production and consumption

### Key words

- diamond
- igneous rock
- magma
- meteorite
- open pit
- rough diamond

### Resources

- Activity Sheet 14: Diamonds – from mine to shop
- Information Sheet 10: The geography of diamonds
- Photo Set 3: Diamonds

### Assessment opportunities

- Quality of diagrams drawn from memory
- Map descriptions and explanations
- Creative writing

### Starter

Tell students they are going to find out about another type of resource. Give pairs of students a copy of Activity Sheet 14, face down on their desk. Once the sheet is turned over they have five minutes to memorise as much information from the sheet as possible. After that, they turn the page back over, take a blank sheet of paper and have five minutes to create a replica of the diagram and text. The pair who produce the closest replica will win. Each pair swaps their effort with another pair to be marked. If some students struggle with this activity, give them a further minute halfway through the drawing phase to look back at the information.

### Main teaching phase

Give the students a further minute to study Activity Sheet 14, allowing them to ask questions about any aspect they don't understand. Now ask them to turn over all the sheets of paper and invite a student to explain the process of diamond formation without looking at the sheets. Other students can step in to help them if they cannot remember the next phase. Give them a further minute to study the sheet again before turning it over. This time they have to draw a perfect replica in their books without looking. This is their final copy so should be neat. Once complete, they can check Activity Sheet 14 for accuracy.

Ask the students 'Why are diamonds valuable?' Now they understand the processes by which they are formed, mined, and cut and polished they should be able to suggest some reasons.

Show images of diamonds at various stages of processing from Photo Set 3 and get the students to say what stage the diamond is at.

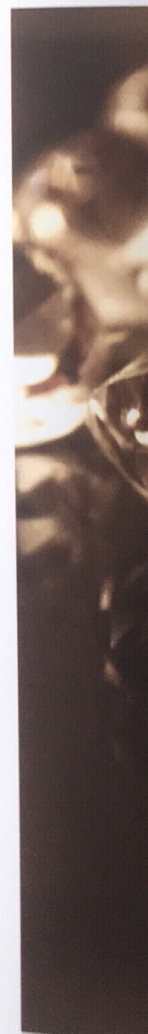
Each student needs a copy of Information Sheet 10. The first map shows the countries that produce (mine) diamonds and the second map shows where most diamonds are sold. Ask students to identify and describe any patterns they can see on and between the two maps.

### Plenary

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### Homewo

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tell their story...



### Plenary

Discuss the differences between the patterns as a class. Students create a spider diagram with 'what explains the pattern?' written in the centre. They should try to think of three reasons for the production pattern and three for the consumption pattern.

### Homework

The students are to imagine they are a piece of carbon that is formed into a diamond, then mined and turned into jewellery, and produce a piece of creative writing to tell their story.

### Teaching tip **i**

Describing a distribution pattern is a specific geographical skill and this exercise provides an opportunity to practise it. When describing distribution, students first need to state any general pattern identified, such as a north/south divide or specific continents. Then they need to give named examples of places that fit this pattern, with any available data. They should also name any anomalies that do not fit the pattern they have identified.



Photo © Kim Alaniz.



## Main teaching phase

Give each student Activity Sheet 15 and an atlas. They should complete the map of West Africa by labelling all the countries, and adding the Equator, the Tropic of Cancer and the Sahara Desert. They will then also need development data for the UK and Sierra Leone in order to complete the table. Some atlases have this information in the back, but for more up-to-date figures they should search online for data, for example from the World Bank database (<http://data.worldbank.org/country>) or the online CIA World Factbook (<https://www.cia.gov/library/publications/the-world-factbook>).

Arrange students into teams of five, numbering each person in the team one to five. Tell the teams they are going on a fact-finding mission to discover why Sierra Leone, which should be very rich given its diamond resources, is actually very poor. Give each team one copy of Information Sheet 11, face down on the desk, and some blank sheets of paper. Give them thirty seconds, as a team, to read the information. Any difficult words can be clarified at this stage.

Now take all the number one students out of earshot of the rest of the team, ideally outside the classroom door or at the back of the room. Ask them all question 1 from Information Sheet 12. They all go back to their teams, find the answer to the question from Information Sheet 11, and write it down. Student two comes out to the front with the team's answer; if they answer the question correctly, give them question 2 to take back to their teams. Student three brings this answer out; if it is correct, you give them question 4. This continues until all five people in each team have given answers. For the final question, which is given to student five, student one gives the answer. The winners are the first team to successfully answer all five questions.

The questions get progressively harder, asking more of the teams each time. It is important that they think about their responses: if the answers are rushed, incomplete or not good enough they should be sent back to their teams. Do not show Information Sheet 12 to the students.

At the end of the game all students sit back down again. Briefly review the answers from the winning team.

## Plenary

As a class, discuss 'If Sierra Leone is diamond rich, why are all the people poor?' Ask pairs of students to come up with two answers to this question and share their responses with the class.

## Extension task

Students could draw a simple set of graphs to compare the development of the UK and Sierra Leone.

## Homework

The students could do some extended writing in answer to the question 'If Sierra Leone is diamond rich, why are all the people poor?' Activity Sheet 16 is a writing frame to plan their thoughts. They should use the information from the game just played, and copies of Information Sheet 11, to help them.

## Teaching tips

The active nature of this game will appeal to kinaesthetic learners, and the element of competition will motivate some students.

There is a popular song by Kanye West and Jay-Z called 'Diamonds from Sierra Leone' in which they rap about the blood diamond situation. They rap 'Little was known of Sierra Leone, and how it connect to the diamonds we own'. It does contain a swear word towards the end of the song, but parts of it could be used with some groups. Both the song and lyrics can be found easily online.



## LESSON 9: Made to last?

### Key questions

- What resources are essential for human survival?
- How will Earth's population change in the future?
- Will we ever run out of resources?

### Learning objectives

- To know what resources are vital for human survival
- To produce and interpret a graph of population growth
- To understand two possible resource futures and be able to critically engage with each

### Key words

- carrying capacity
- overpopulation
- underpopulation

### Resources

- Activity Sheet 17: World population growth data
- Activity Sheet 18: Possible population futures
- Information Sheet 13: Possible population futures (answers for teachers)

### Assessment opportunities

- Graph drawing
- Graph annotation
- Extended writing

### Starter

Pose the question 'What resources are essential for human survival?' Working in pairs, students produce a bullet point list of resources and share it with the class. Water, air, food and energy should come up; along with land, housing, clothing, etc. They need to put an asterisk by those resources that they think could be unsustainable, based on the work covered so far in this unit.

### Main teaching phase

Students use the data in Activity Sheet 17 to calculate the total population for the three years presented, then construct a line graph to show how population has changed over time in LDCs, MDCs, and in total. Higher ability groups could draw a composite line graph, stacking the data for LDCs and MDCs. They then answer the questions below the graph.

In pairs, students should try to explain the population change, linking it back to the idea of essential resources discussed at the start of the lesson. They should annotate their graph with three or four sentences to explain the change in population; finally, they try to predict what the total population will be after 2050.

Now, ask the students 'Will we ever run out of resources?' If people need resources, and more and more people are living in the world, will we run out? After the students have given their initial response, explain some key terms from the glossary: underpopulation, overpopulation and carrying capacity. Then get the students to define each of these terms in their own words. They should read their definitions out so you can check that they have understood the concept.

Give out Activity Sheet 18. There are two graphs, each expressing a different theory of how population reacts with 'carrying capacity'. Students should look at the graphs carefully and try to explain in their own words what is happening in each, sharing their ideas with the class. The answers are on Information Sheet 13. In pairs, students debate the question 'Which idea is most likely to be correct?' One student will argue for the first theory, the other for the second. Give each student ten minutes to construct and write out a persuasive argument,



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Photo © James Cridland.

backing it up with as many examples as they can from the work covered in this unit.

The debate can be widened to larger groups or the whole class. Choose a few students to present their arguments to the whole class, with you acting as the chairperson. There may not be enough time for every student to speak. Alternatively, students working in groups could organise their own debates with one person acting as chairperson.

## Plenary

Having had the debate and heard all sides of each argument, the students now have to decide what they think will actually happen. Will we be able to resource an increasing population indefinitely, or might we one day run out of resources? They write their own answer to the question 'Will we ever run out of resources?' They could write three paragraphs: one to support the first theory, one to support the second and a third paragraph for their own opinion.

*How will Earth's population change in the future?*

## Teaching tips

Analysing a graph is another key GCSE skill that should be developed in key stage 3. Students should first describe the overall trend. Does it go up or down? They need to back this up with some data read off the graph. They should also identify any anomalies in the pattern they have described.

Many students really enjoy debating and the chance to argue persuasively. This activity gets them to apply their understanding of resources developed by this unit and to use data to back up their assertions.

## LESSON 10:

### Costing the Earth?

#### Key questions

- What are our global resource futures?
- How can Earth meet our resource needs?

#### Learning objectives

- To appreciate there are different possible resource futures
- To use their understanding to predict future changes to resource sustainability

#### Key words

- future
- sustainability

#### Resources

- Activity Sheet 19: What are our global resource futures? (A3 size)

#### Assessment opportunities

- Completion of Activity Sheet 19
- Action plan bullet points

#### Starter

Get the students to close their eyes and think 'What will the world be like in the future?' Ask them to envisage life in 50 years – how old will they be? What might they be doing? Where will they live? They should then think about some of the resources they have studied: oil, tuna fish and diamonds. Will there be any left in 50 years' time? Then think ahead even further, 100 years, to how their children or grandchildren might live. Will there be any of those resources left then? Get students to share their ideas in pairs, then with the rest of the class.

Revise the concept of sustainability. Ask the class 'What makes a resource sustainable? What makes a resource unsustainable?' They should be able to give actual examples from what they have studied so far.

#### Main teaching phase

Each student needs an A3 copy of Activity Sheet 19. This activity requires the students to think creatively about resource use into the future. Each quarter of the sheet represents a different resource. Three have been studied in this unit – energy, tuna and diamonds – the other quarter is for a resource of their choice.

Starting in the middle of the sheet, students choose one of these resources and write briefly how sustainable that resource is at the moment. Staying in the same quarter of the sheet, they think about two alternative futures for that resource – one sustainable, one unsustainable – and write a brief description of the two possible futures, giving reasons why they might happen. Lower ability or younger groups could draw pictures and diagrams rather than writing.

Once they have completed one resource, they do the same for the other resources. In the fourth quarter of the sheet they have an opportunity to consider a resource of their choice. This could be a resource that has been mentioned, but not covered in detail, earlier in the unit; or it could be the local resource if studied briefly in Lesson 2. If they have access to additional research facilities, e.g. internet access, this could widen the choice of resources for the final section. Their ideas can be shared with the class.

#### Plenary

How will we create a sustainable future? Each student picks one of the resources and thinks about how it can be made sustainable. What needs to happen? National governments will need to create a sustainable future for the world. What should be in the form of an action plan? What needs to happen, and how? Then share them with the class. The class could assess how likely each plan is to succeed.



# GLOSSARY

- alluvial diamonds** – diamonds that have been removed from their original source by erosion over millions of years and deposited in a new environment
- blood diamonds** – a type of conflict resource; diamonds whose profits are used to fund fighting
- bycatch** – anything caught in a fishing net that was not part of the intended catch
- carrying capacity** – the maximum number of people that can be supported by the land and resources
- commercial fishing** – large-scale fishing, for sale rather than subsistence, by professional companies often using large trawlers
- conflict resource** – a resource whose profits are used to fund wars
- consumption** – the use or exploitation of a particular resource
- development** – growth; usually economic advancement
- diamond** – a natural mineral formed from carbon; a valuable resource
- dynamo** – coils of electric wire within a magnetic field, used to generate an electrical current
- ecosystem** – how animals and plants interact with each other and their environment
- electricity generation** – the process of generating electric power from other sources of energy
- energy security** – where a country or region is able to meet all its energy needs
- essential resource** – a resource that humans cannot live without
- finite** – limited in size or extent, not lasting
- food chain** – a system which shows the links between living things as the predator of one and the source for another's food
- food web** – a diagram that shows what eats what in an ecosystem
- fossil fuel** – a finite energy resource – mainly oil, coal and natural gas – that was formed millions of years ago
- future** – a time which has yet to occur
- GDP** – Gross Domestic Product, or the financial value of all the goods and services produced within a specific country in a specified time, usually one year
- igneous rock** – a very resistant type of rock formed from the cooling of volcanic magma, e.g. granite
- impermeable rock** – a type of rock which does not allow any liquid to seep through it
- magma** – the hot, liquid rock beneath Earth's surface
- meteorite** – a type of rock debris that arrives on Earth from space
- non-essential resource** – a resource that is not essential to life, but is desirable or improves the quality of life
- non-renewable/finite resource** – a resource which will run out
- oil** – a sticky black liquid fossil fuel
- oil rig** – a construction that enables oil to be pumped out of the rock under the seabed
- open pit** – a method of mining in which the rocks and minerals are dug out from the surface of the ground
- overfishing** – when the catch exceeds the replacement rate of the fish; an unsustainable practice
- overpopulation** – too many people for the resources available
- plentiful resource** – when there is a large quantity of a resource
- pole and line fishing** – a type of fishing using fishing lines, rather than trawl nets
- power station** – a place where electricity is generated on a commercial level
- predator** – an animal that preys on another
- production** – the processing of a particular resource
- renewable/infinite energy resource** – a resource which can replenish itself, and so will never run out
- resource** – something that we can use
- resource deficit** – when there is less of a particular resource than needed
- resource curse** – when a country is negatively affected by the presence of a resource
- resource insecurity** – when a country or region does not have enough of a resource to meet its needs
- resource security** – when a country or region has all it needs of a particular resource
- rough diamond** – a diamond as it is taken from the ground. It needs to be cut and polished to make it into a jewel
- scarce** – not enough of a particular resource to meet the need
- superpower** – an extremely powerful or dominating country
- surplus** – when there is more of a particular resource than needed
- sustainability** – the continued use of a resource without it running out, being wasted or damaging the environment around it
- underpopulation** – when there are fewer people than the resources are able to support

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## FURTHER SOURCES FOR IDEAS

### Online CPD from the GA

The GA has a series of lesson plans and resources on the themes of sustainability and resource use that can be used in addition to the lessons in this *Toolkit*.

#### Sustainable energy and the local community

[www.geography.org.uk/cpdevents/onlinecpd/younggeographersgogreen/sustainableenergy/#top](http://www.geography.org.uk/cpdevents/onlinecpd/younggeographersgogreen/sustainableenergy/#top)

#### Planning for sustainability

[www.geography.org.uk/cpdevents/onlinecpd/younggeographersgogreen/planningforsustainability/#top](http://www.geography.org.uk/cpdevents/onlinecpd/younggeographersgogreen/planningforsustainability/#top)

#### Everyday sustainability

[www.geography.org.uk/cpdevents/onlinecpd/younggeographersgogreen/everydaysustainability/#top](http://www.geography.org.uk/cpdevents/onlinecpd/younggeographersgogreen/everydaysustainability/#top)

#### Plenty more fish in the sea?

[www.geography.org.uk/cpdevents/onlinecpd/geographyoffood/plentymorefish/#top](http://www.geography.org.uk/cpdevents/onlinecpd/geographyoffood/plentymorefish/#top)

#### GTIP Think Piece: Education for Sustainable Development

[www.geography.org.uk/gtip/thinkpieces/esd/#330](http://www.geography.org.uk/gtip/thinkpieces/esd/#330)

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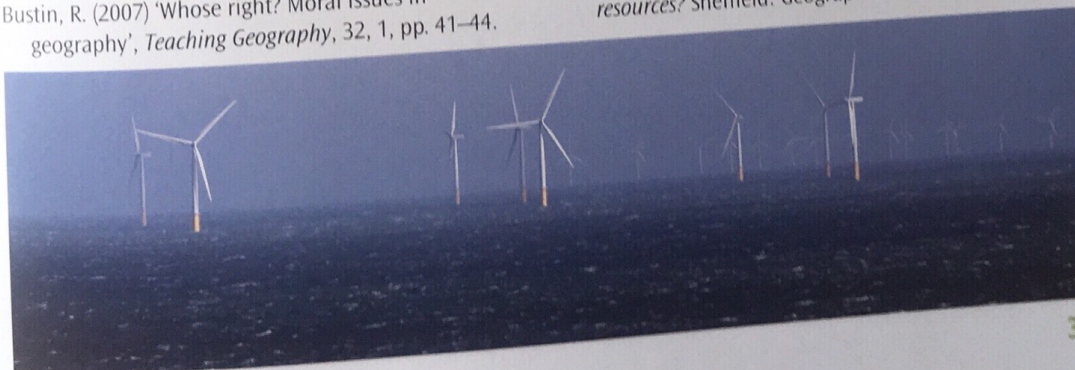


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## KS3 GEOGRAPHY TEACHERS' TOOLKIT

# ASSESSMENT FRAMEWORK

Students should be expected to make progress throughout their KS3 geography programme and within each unit of work. Of course, the starting and finishing point for each student (what were previously described as 'levels' in the geography National Curriculum) will differ for each student. Rates of progress will also differ.

In the diagram below, student progression is measured in three broad bands – what might previously have been described as 'levels'. These bands are;

- most students at KS3 (previously levels 5-6)
- students who progress at a slower rate (previously levels 3-4)
- students who progress at a faster rate (previously levels 7-8).

The diagram describes the learning outcomes for students in each of the three bands.

### **Students who progress at a slower rate:**

- know what a resource is
- know what sustainability means
- understand how electricity is generated from oil
- know what energy security means, and how it enhances Russia's superpower status
- understand what makes tuna fishing and diamond mining unsustainable
- appreciate that there are different possible resource futures.

### **Most students:**

- know what a resource is, and what the different types of resources are
- know what makes a resource sustainable or unsustainable
- understand how oil and other sources of energy can be used to generate electricity
- know the meaning of energy security and use data to assess Russia's energy security and global importance
- critically reflect on what makes tuna fishing and diamond mining unsustainable, using data and examples
- analyse a range of resource futures, both sustainable and unsustainable.

### **Students who progress at a faster rate:**

- know what a resource is, and what different types of resources there are, with named examples
- know what makes a resource sustainable or unsustainable, with examples of each
- understand and critically reflect on the process of electricity generation, and assess the sustainability of different approaches
- know in detail the meaning of energy security and use data from Russia and the UK to assess their energy security and changing global importance
- understand and critically reflect on what makes tuna fishing and diamond mining unsustainable, using data and examples and offering considered ideas about future sustainability
- analyse a range of resource futures, both sustainable and unsustainable, and offer suggestions to increase sustainability.

