



Social Justice:

Equality for All:



Sustainable Development, Health and Social Studies: Student Workbook



About the Author

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About the Environmental Association for Universities and Colleges (EAUC)

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1. Introduction

The purpose of this workbook is to introduce the topics of sustainability and sustainable development and to link them to health and social studies where applicable. There are a number of reasons why sustainability and sustainable development have become increasingly important in recent years, including the issue of climate change caused by human actions. However, sustainability does not mean only looking at climate change and the problems associated with it, but also considers other issues such as population growth, the use of limited resources and social justice. This workbook begins by explaining why we should be concerned about climate change and then moves on to provide information about other areas of our lives we could consider changing in order to live a more sustainable life within the confines of the one planet we call home – the planet Earth. Furthermore, links are made to the beauty industry and curriculum when possible to enable students to understand sustainability in terms of their chosen career choice.

1.1 Climate Change

The Earth's climate has varied naturally throughout its history, with periods when it was much warmer than today and 'ice ages', when Scotland was under glaciers a kilometre deep. However, during these times the Earth was much less densely populated than it is today. As you are probably aware, the Earth is now going through another period of warming – but this is different from those that have happened in the past. Over the last century global temperatures have been rising and scientists have concluded that this recent warming cannot simply be explained as natural variability. Human activities, mainly the emission of greenhouse gases (GHGs), are playing a major part. The main causes are the burning of fossil fuels (such as oil, coal and gas), and changes in land use, such as deforestation. As we increase emissions, the GHGs in the atmosphere also increase. This is resulting in an increase in global average temperatures, average sea level is rising, and snow and ice are melting at an alarming rate (IPCC, 2014). The Intergovernmental Panel on Climate Change has also concluded that most of the warming that has occurred since the mid twentieth century is very likely due to man-made GHG emissions.

These GHG emissions are 'enhancing' the natural greenhouse effect. The greenhouse effect is a process which keeps the planet warm due to GHGs in the atmosphere trapping radiation from the sun – without it, the Earth would be much colder, around -18°C. The best known GHG is carbon dioxide (CO₂), but there are a number of others, including methane (CH₄), nitrous oxide (N₂O) and water vapour (H₂O). Put simply, adding GHGs to the atmosphere enhances the greenhouse effect and results in global warming. Diagram 1 - The Greenhouse Effect shows the natural greenhouse effect without man made interference, however the addition of extra GHGs in the atmosphere causes more of the sun's solar radiation to be trapped causing the temperature on earth to increase.

Diagram 1 - The Greenhouse Effect



Source: Intergovernmental Panel on Climate Change Assessment Report 4 (2007)

The latest research conducted by experts at the Met Office suggests that if we (and others around the world) continue to operate on a 'business as usual' basis, then we could see an increase in the global average temperature of around 4°C before the end of the 21st century. In addition to the changes already mentioned, this increase in global temperature will bring with it major changes to weather patterns and an increasing frequency and intensity of extreme weather events such as hurricanes, heavy rainfall events and heat waves. Such a large and fast change in climate is dangerous and will have severe and costly impacts (Stern, 2007). For example, our ability to produce food around the world will decrease significantly, hundreds of millions of people will face water stress while millions of others will face flooding, and around a third species are likely to become extinct by the end of the century (IPCC, 2014).

Scotland, and the rest of the UK, will not be immune from the effects of climate change. Unless we seriously change our lifestyles to cut CO₂ emissions, average temperature increases of up to 3°C in the winter and 4°C in the summer are likely to be experienced by our grandchildren and great-grandchildren (Met Office). The related weather changes are likely to mean floods, droughts and dangerous heat waves, with a rise in heat-related deaths. In 2003, 37,000 people died because of a heat wave in Europe, over 2,000 of which were in the UK (Met Office). Winters will be significantly wetter, with more intense rainfall. This would mean more flash floods, with rivers bursting their banks more often. Other impacts include an increasing incidence of severe gales and sea level rise affecting coastal areas causing flooding of coastal homes and businesses and coastal erosion.

Action now needs to be taken to reduce GHG emissions to ensure that global temperatures do not rise by more than 2°C; this will help to limit the most severe impacts of climate change. This challenge has been accepted by the UK and Scottish governments with the passing of The Climate Change Act 2008 and The Climate Change (Scotland) Act 2009, both of which set a legally binding target to reduce emissions by 80% from 1990 levels by 2050. In Scotland, the first interim target is a reduction of 42% below 1990 levels by 2020. As a result, we will see an increasing regulatory requirement to reduce emissions in both the workplace and the home. Everyone has to play their part in the drive to a more resource efficient, low carbon system if we are to meet these targets and avoid catastrophic interference with the climate system.

Due to the global recession, it is likely that global emissions have fallen due to a reduction in fossil fuel use. The Earth's climate is also going through a natural cooling period, hiding the true extent of climate change for a short period. This may make it seem like we have turned a corner and that the problem has been solved. This will not be the case. Tackling the global climate will be a major project for the whole of humanity and throughout the lives of everyone at the College. We need to do all we can to reduce our GHG emissions by using fewer fossil fuels, more renewable energy and changing our lifestyles to reflect this. Climate change is coming, but with your help, we can reduce its impacts for ourselves and the generations which follow us.

1.2 Sustainable Development

Climate change will affect us all, and is impacted by our current economic model which is reliant upon the use of fossil fuels for continual economic growth. However, people around the world are increasingly recognising that current economic development trends are not sustainable and that there is an alternative model which is sustainable development. Sustainable development is a difficult concept to define; it is also continually evolving which makes it even more difficult to define. One of the original descriptions and arguably the most famous was coined by the Brundtland Commission and states that,

'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987).

With sustainable development the economy is not considered in isolation but is interlinked with society and the environment. If the three aspects of sustainable development are considered as three circles of the same size, the overlap in the centre is where human well-being is achieved. As the three elements of society, environment and economy become more aligned, the area of overlap will increase and so will human well-being.



In order to move towards sustainability, public awareness, education and training are required – which is the purpose of this workbook. Whilst it is acknowledged that education is one of the key drivers to moving society towards global sustainability, the difficulty in defining sustainable development and whether it is achievable or not, continues to hamper progress. Also, different cultures have different visions of what a sustainable community will look like and how it will function. These issues and the lack of an agreed definition and vision has made efforts to implement education for sustainable development (ESD) very challenging.

1.3 Education for Sustainable Development

The United Nations Decade for Education for Sustainable Development (UNDESD) ended in November 2014. The UNDESD was a global initiative that recognised the vital role that education has to play in the transition to achieve societal change that motivates all generations to develop a sustainable future (UNESCO, 2004). The overarching goal of the UNDESD was to 'integrate the principles, values and practices of sustainable development into all aspects of education and learning, and all areas of life including communities, the workplace and society in general' (UNESCO, 2004). The Scottish Executive stated Scotland's response to the UNDESD by publishing the '*Learning for our Future*' action plan which advised what it wanted to achieve in the first five years of the UNDESD. An important aim of '*Learning for our Future*' was by 2014 to give people the 'knowledge, understanding, skills and values to live sustainable lives by fully integrating sustainable development into all stages of the formal education system' (Scottish Executive, 2006). Five years on the Scottish Government published '*Learning for Change*', Scotland's action plan for the Second Half of the UNDESD which reviewed the original plans to consider progress made to date, and also advised the actions required for the second half of the UNDESD. The Scottish Government announced progress made in the education sector considering climate change targets where they praised the progress made to date in the further education sector but highlighted the need to further embed ESD within all curriculum areas.

The concept of using education to achieve sustainability through a just and ecological society is not a new one. Schumacher (1973) acknowledged education as the 'greatest resource' we have at our disposal for attaining a paradigm shift to a sustainable way of life. The World Conservation Strategy also stated, 'a new ethic, embracing plants and animals as well as humans is required for human societies to live in harmony with the natural world' and 'the long-term task of environmental education is to foster attitudes compatible with this new ethic' (IUCN, UNEP & WWF, 1980). Although this brought the term sustainable development to the public arena, it aimed to achieve it through conservation and was therefore limited to ecological sustainability and did not link sustainability to wider social and economic issues (Baker, 2006, p18).

It was not until the Brundtland Report that social, economic and ecological aspects of development were explicitly considered together (WCED, 1987). The Brundtland Report also argued that 'teachers had a crucial role to play in helping to bring about the extensive social changes necessary for sustainable development' (WCED, 1987). In 1992 the United Nations Conference on Environment and Development produced Agenda 21, a comprehensive document which committed countries to promoting environmental sustainability through practice. This included education and community based projects at a local level highlighted by Local Agenda 21.

The first difficulty to overcome prior to evaluating or implementing ESD is determining exactly what it means. It was first defined by Chapter 36 of Agenda 21 which identified four major components of ESD which are, to improve basic education, reorient existing education to address sustainable development, develop public understanding and awareness and training (UNDESA, 1992). However, definitions vary and attempting to establish an agreed definition of ESD still causes considerable academic debate which means it remains a contested phrase (Jones et al. 2008). One definition is that 'ESD should be presented as 'coping with' rather than definitively 'solving' the 'ecological crisis' (Barry, 2007). However, this suggests we should adapt to the ecological crisis we are enforcing upon the Earth because it is inevitable, rather than change our behaviour to lessen our impact and avoid ecological crisis. ESD has many definitions, but this workbook encompasses the view that 'sustainable development education is the process of acquiring the knowledge, skills and attitudes needed to build local and global societies that are just, equitable and living within the environmental limits of our planet, both now and in the future' (SDE, 2008). Definitional conflict about all aspects of sustainability is nothing new, and there is still conflict today in understanding the term sustainable development, as it appears to 'bring into harmony two politically attractive but potentially conflicting notions' which is difficult to reconcile (Bonnett, 1999). If sustainable development still cannot be defined easily it is not surprising that neither can ESD.

There is definitely scope for further research into the Scottish College system to establish best practice for incorporating ESD within the curriculum at all levels in Scotland's Colleges. Dumfries and Galloway College has taken a major step forward in embedding ESD within the curriculum by implementing this project to produce a range of workbooks across the curriculum. However, to be effective it has been acknowledged that staff and student engagement is vital.

The chapters that follow aim to provide some of the information required for staff and students to make informed choices about living their lives in a more sustainable fashion and offers advice and activities where sustainability can be embedded within health and social studies related subjects.

2. Social Justice

What does justice mean to you?

There are many different explanations of justice, often based on different cultural beliefs around the world and over time. However, most people believe that justice should be about fairness and equity. Therefore, if we agree with this, we believe everyone should be treated fairly and the same, but is this reality? We know that people around the world are not all treated the same; we don't all have access to the same opportunities. When we talk about justice and equality for people, we might



automatically mean only people that are alive right now (intergenerational equity), however, another argument is that we should also consider people that will be alive in the future (intragenerational equity). It could be further argued that we should not only consider people but other species also.

Some of the words below may relate to your feelings about social justice however as we all have different ideals and values; there will probably be many others that you can think of that mean something to you on a personal level.



2.1 Activity 1 – What does Sustainable Justice mean to me?

Design your own word cloud using Wordle at <u>http://www.wordle.net/</u> with words that mean justice to you.

Your 'Sustainable Justice' Wordles can be made into posters to share with the rest of your classmates.

2.2 Individual Rights and Responsibilities

As individuals we all have rights we are entitled to and responsibilities we should adhere to. At certain ages the law gives you the right to do certain things, examples include:



There are several differences between Scottish law and the rest of the United Kingdom and the table above provides just a few examples. For more information about what you can do at what age in Scotland, see 'What can I do at my age?' at:

http://www.scotland.gov.uk/Publications/2009/04/02155040/1

You may be surprised by some of the answers!

The United Nations adopted The Universal Declaration of Human Rights in 1948 because of the experiences of many individual and countries during the Second World War. At the end of that war the United Nations was created and the international community agreed they would never again allow the atrocities that happened during the war to happen again. Have a look at the Universal Declaration of Human Rights by clicking on the link below and consider the different Articles. You may want to think about how many you take for granted and if you think everyone around the world has the same rights you have.

http://www.un.org/en/documents/udhr/index.shtml

2.3 Activity 2 - Rights and Responsibilities

We have rights as individuals, which in most democratic societies are covered by laws, we also have responsibilities, which could be legal requirements we must comply with, but may also be moral responsibilities. Some examples of the rights we have in the UK are shown below. Complete the table by entering some more human rights we have in the UK and put in some information about the other rights shown. You may also want to look at other rights which are not shown here and record some details about them. A good place to start your search for this information is at:

http://www.direct.gov.uk/en/Governmentcitizensandrights/index.htm

Rights in the UK

Human Rights:

- The right to life
- The right not to be tortured
- The right to liberty
- The right to a fair trial
- The right to marry and start a family
- The right to an education
- •
- •
- .
- •
- .
- •
- •

The right to peaceful protest:
Parental rights and the rights of children:
Employment rights:
Disability and equality rights:
Consumer rights:

Other rights:

In the UK we not only have rights we are entitled to but we also have legal responsibilities we must comply with. However, based on what our values and beliefs are, we may also impose moral responsibilities upon ourselves and may expect that other people should have the same moral responsibility beliefs as us. The table below has been started with some examples of legal and moral responsibilities, remember what one person believes to be a moral responsibility another person may not agree with. Complete the remainder of the table with examples of responsibilities that are important to you.

Responsibilities (Legal)	Responsibilities (Moral)
Parental responsibilities: Provide a home for the child Protect the child	I will recycle wherever possible

2.4 The United Nations Millennium Declaration and Millennium Development Goals

The United Nations made their Millennium Declaration in the year 2000. The Declaration, which was agreed by 189 nations, made a promise to free people from extreme poverty and multiple deprivations. As a result of the United Nations Millennium Declaration, this pledge became the 8 Millennium Development Goals, which were to be achieved by the year 2015. All 191 United Nations member states signed the Declaration in September 2000, and agreed to try and achieve the 8 Goals. By signing the agreement, world leaders committed to combatting poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women. All of the 8 Millennium Development Goals (MDGs) had specific targets and indicators set against them.

The 8 Millennium Development Goals were:

- 1. To eradicate extreme poverty and hunger;
- 2. To achieve universal primary education;
- 3. To promote gender equality and empower women;
- 4. To reduce child poverty;
- 5. To improve maternal health;
- 6. To combat HIV/AIDS, malaria, and other diseases;
- 7. To ensure environmental sustainability; and
- 8. To develop a global partnership for development.

The MDGs were designed to be inter-dependant, however all influence health and health influences all of the MDGs. For example, better health care impacts education and empowers women. Gender equality is also essential for the achievement of better health. Reducing poverty, hunger and environmental degradation also require better health, as better health positively influences these factors also.

2.5 The United Nations Sustainable Development Goals

The United Nations Sustainable Development Goals replaced the Millennium Development Goals in 2016. Whilst the MDGs had a dedicated goal to ensure environmental sustainability, the 17 Sustainable Development Goals (SDGs) all have sustainability embedded within the core of each Goal. The 17 SDGs include 169 targets and their purpose is to build upon the work started by the MDGs and complete what they failed to achieve. The ultimate realisation is human rights for all and to achieve gender equality by the empowerment of all women and girls. The SDGs are integrated and indivisible and balance the three dimensions of sustainable development: the economic, environmental and social. The plan for the SDGs is 'Transforming Our World: the 2030 Agenda for Sustainable Development.

For full information about the Agenda and the Declaration itself, follow the link, <u>https://sustainabledevelopment.un.org/post2015/transformingourworld</u>

The 17 SDGs are shown next.



Full details of each Goal, and its associated targets are available on the United Nations website at;

https://sustainabledevelopment.un.org/sdgs

Hover above the picture of each SDG for a description of that Goal. Click on the picture to get full details of the progress to date for achieving the Goal and for the targets set for each Goal. This link is required for the next activity.

2.6 Activity 3 – Targets of the United Nations Sustainable Development Goals

Choose 4 of the SDGs and thoroughly consider and list the targets that have been assigned to each.

Next look at the progress made to date for each chosen Goal and record your thoughts on whether you believe the progress to date is good or bad, explaining why you think this.

Ensure you explain your opinions about the progress to date in relation to the targets that have been set.

3. The Life Cycle of Everyday Objects

Life Cycle Analysis (LCA) is a process used to measure the environmental impact of a product or process, from the beginning of its life to the end, or from the 'cradle to grave'. As we can see from the diagram below, to make any product we need to start with the raw materials and then determine how they are processed to make the product, how the product is then used, before it is either discarded or recycled.





Think about what everyday objects are made of, the resources and energy used to make them, how long they can be used for, and what happens to them at the end of their useful life. You may also need to consider the following: -

- Different types of products and services have their most significant climate impact at different stages in their life cycles.
- For products with a long life and high energy consumption, the Use Phase typically accounts for the most significant climate impact, for example a washing machine.
- Other products will have their greatest impact during the production phase this is usually the case for food production.
- Some products may not be recyclable and may need to go to landfill.

This is just a small snapshot of the impacts of the life cycle of an object. To see the full environmental impact of the products we consume, go to <u>https://storyofstuff.org/movies/story-of-stuff/</u> and watch the Story of Stuff video.

3.1 Activity 4 - The Life Cycle of Cotton Wool

Here we have a picture of some cotton wool. It looks like a simple product. Have a good look at the picture and think about the following questions. Use the internet to search for information to answer the questions.

Q1. How are the materials produced to make cotton wool? Where do the materials come from?

Q2. How is it processed? What energy do you think has been used?

Q3. Once made, how does it get to the distributors that sell it?



Q4. What happens to cotton wool after it has been used?

Q5. Can you think of other environmental impacts not already considered? (For example, what about water resources to grow cotton and how are the people treated that grow it)?

There are many materials used in the HEALTH industry that are designed to be used once and then thrown away. Obviously, this is often due to the risk of cross contamination between patients and it may not always be possible to have alternatives, for example sterile dressings. However, many medical drugs and equipment rely on oil, particularly plastic equipment. Therefore, should we think about reserving oil for medical reasons, such as prosthetic limbs, instead of burning it for transport purposes?

3.2 Activity 5 - The Story of Stuff

Critically analyse the movie, The Story of Stuff, as a class discussion. Start to build upon what you have learnt so far to determine if you can start to think of any changes you would like to make to your lifestyle.

4. Carbon Footprints

In the previous section the environmental impact of making things was considered. In our everyday lives we use hundreds of different products, all of which have an environmental impact throughout their lifetime. Producers of goods and services are increasingly becoming aware of these impacts and are starting to think of measures they can use to limit the amount of environmental damage their product is responsible for. One method of measuring this impact is carbon footprinting. A carbon footprint is the total set of greenhouse gas (GHG) emissions caused by an organisation, event or product (UK Carbon Trust, 2009). To make it easier to report, it is often expressed in terms of the amount of carbon dioxide, or the amount of carbon dioxide equivalent of any other GHGs emitted.

A product's carbon footprint is the total amount of GHGs produced across its life cycle from extraction to recycling or disposal. To measure a product footprint there is a 'basket of six' greenhouse gases that are measured, these are: -

- Carbon dioxide (CO₂)
- Nitrous oxide (N₂O)
- Methane (CH₄)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF₆)

Many producers are now starting to measure the carbon footprint of the goods they produce. If a producer or manufacturer wants to reduce the carbon footprint of a product or services it needs to know how big it is first. Boots the Chemist, with help from the Carbon Trust, has measured the carbon footprint of their Botanics shampoo range and as a result they determined where they could make reductions in the footprint of the products.



We've reduced the carbon footprint of Botanics shampoo by 20%

You can help too. Using cooler water to wash your hair cuts CO₂ emissions, reduces your energy bills and is actual etter for your hair.



4.1 Carbon Footprint of Products

Increasingly, companies are now looking at their products to establish how they can reduce the carbon and environmental footprint of their products. Lush, for example has taken steps to reduce the environmental impact of their products, such steps include:

- recycling 85% of its waste,
- retrofitting their shops to improve energy efficiency,
- banning domestic flights for staff,
- installing renewable energy systems,
- designing products to be package free
- designing their handmade products that do require packaging to be made from recycled materials,
- encouraging customers to return used containers and plastic bottle tops which they recycle internally,
- investing in sustainable farming and community projects in developing countries

More information about how Lush manages to be a profitable, but sustainable, beauty product developer can be found on their website.

It is not just hair and beauty products that manufacturers are looking at, below is an example of carbon footprint information for a brand of washing powder and an Innocent smoothie.



When measuring a carbon footprint, it is important to explain what the amount of carbon measured relates to, or to provide a meaningful unit. In this example the carbon footprint of 850g CO₂ is the amount per washing machine load.

This example refers to the amount of CO₂, 294g, per bottle of mangoes and passion fruits smoothie.



The main benefits of calculating a product footprint are to identify savings both in terms of money and for reducing carbon emissions. Also as customer demand grows for more 'eco-friendly' products it can be used to advertise a company's green credentials. If customer demand is sufficient this puts pressure on producers and suppliers to think about the environmental impact of their products they make and sell.

The internet is a useful tool for finding information on the carbon footprint of products. A good place to start is the Carbon Trust website at <u>http://www.carbontrust.com/our-clients</u> and look at some of the case studies for ideas on reducing GHG emissions which help lower carbon footprints. Carbon foot printing can also be used to measure the GHG emissions from an event such as a conference or a festival.

4.2 Activity 6 - Your Carbon Footprint

It is not only organisations, products and events that have carbon footprints. Activities in our daily lives cause GHG emissions and we can measure the amount to determine our own individual carbon footprint, just like we considered product carbon footprints in the previous section.

The areas of our lives that generate most of our individual GHG emissions are because of:

- Electricity use
- Travel and transport
- Food production
- Buildings we use
- Waste

Carbon footprints are a sub-section of ecological footprints. Ecological footprints look to measure one person's impact upon the world, or the amount of resources or space that are required for an individual to live their life. Go to the following website, <u>http://footprint.wwf.org.uk/</u> and enter the data to reflect your lifestyle, it will only take a few minutes to do so. Based on the information you provide regarding the way you live; the calculator will estimate how much of your share you are using to support your lifestyle. This is based on the amount of land required to produce the quantity of resources that you consume.

Record here how much of your share your lifestyle requires _____%

You may be surprised by the results! Remember we only have one earth!





4.3 Carbon Footprints around the World

Not everyone in the world lives in the same way as many of us do in Scotland and other industrialised countries. Some people are more environmentally aware and try to limit their impact upon the Earth and its resources wherever possible, whilst others don't. Also, not everyone has access to the same amount of the Earth's resources or the means to live as we do in the Western world. The diagram below shows the average carbon footprint of the average American in tonnes of carbon dioxide equivalent, this is compared against the average carbon footprint of someone who lives in Dumfries in Scotland.



In 2010 the average American had a carbon footprint of just over 28 tonnes of carbon dioxide equivalent and the average carbon footprint in Dumfries was nearly 13 tonnes of carbon dioxide equivalent. Whist the carbon footprint of the average person in Dumfries is significantly lower than the average American; we are still not living within the available resources on the Earth if everyone alive were to have the same share. Ecological footprints measure the number of hectares of land that are required to provide all of the goods and services a person consumes. To put this into perspective, the average American person needs 8 hectares of land to support their lifestyle, the average British person needs around 5 hectares and the average person in Malawi uses only uses 0.6 hectares of land (Global Footprint Network). This highlights the social injustice that exists between different lifestyles around the world.

Put simply if everyone in the world lived like the average American we would need another five planets to supply all of the resources required!

Unfortunately, we do not have FIVE EXTRA Earths!



5. Sustainability and Sustainable Development

Sustainability and sustainable development were introduced briefly in Chapter 1, and then further built upon when examining the United Nations Sustainable Development Goals, but we will now look at them in a bit more detail.

Sustainability and sustainable development are concepts which we are frequently hearing more and more about, and which are being related to many different areas of our lives, such as sustainable communities, sustainable transport or sustainable buildings. However, before we can begin to consider these, we need to know what sustainability and sustainable development mean. The original and most famous description of sustainable development was introduced to you earlier, but here is a reminder:

'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987).

However, what does this actually mean? One person's needs are very different from another's and how do we know what needs future generations will have? Taking all of this into consideration some of the elements of sustainability include:

- Conservation and preservation of the natural environment, built environment and resources.
- Care of people, other species, ecosystems and biodiversity.
- Culture protecting different cultures around the world but also looking at how cultures change as attitudes change.
- Communities at a local, national and global level.

However, all of these elements can be incorporated into 3 main components which are:

- Social
- Economic
- Environment



Often when we think of or refer to development, we are meaning economic growth or economic development, however with sustainable development the economy is not considered in isolation but is interlinked with society and the environment and all three aspects are just as important. As mentioned earlier, if the three aspects of sustainable development are considered as three circles of the same size, the overlap in the centre is where sustainability is achieved and this can help to ensure we have human well-being. As the three elements of society, environment and economy become more aligned, the area of overlap will increase and so should human well-being.

Another way to understand what is required from the three elements of sustainable development to achieve sustainability, is to show the three elements as three pillars of sustainability. This demonstrates how equally important each pillar is because if any of the pillars are weak or removed the whole system becomes unstable and therefore unsustainable.



5.1 Social Sustainability

Social sustainability is the social systems within countries and organisations, on a large scale, but also down to community and family levels, to function harmoniously so there is social well-being. Social sustainability is disrupted by problems such as war, poverty, social injustice, low education rates and poor health care availability. All of these are symptoms that a system is socially unsustainable. Social sustainability can also be considered between countries or generation, for example the vast differences between the quality of life in developed and developing countries and also how we live now will affect people that live after us.

Social sustainability is defined in relation to people to improve our quality of life, and the quality of life for our descendants. However, this is often where the biggest challenges lie because there is often global disagreement on what the goals are to achieve this. Nations disagree with each other, as do political parties within nations, religions, cultures and even organisations.

5.2 Economic Sustainability

Economic sustainability is the ability of an economy to support a required level of economic production. This can be impacted by issues such as global recessions, which has been evident since the recession in 2008. This has stopped progress on environmental sustainability as the funds for resolving environmental problems are often diverted elsewhere when there is a shortage. Balancing economic sustainability effectively involves economies being able to maintain themselves when resources are declining or becoming too expensive to obtain, or when population are increasing putting additional stress on already depleted resources.

There is a strong correlation between economic and environmental sustainability because many of the resources required for economic sustainability are natural resources, such as forestry, fossil fuels, precious metals and minerals. However, the dilemma is how to extract and use these resources without causing environmental degradation, and if they are not renewable resources, using them all so they are unavailable in the future.

Another issue associated with economic sustainability is can the economy continue to grow year on year? The earth is a closed system, and the resources that we have available are finite. Once they have been used we cannot go elsewhere to get some more.

5.3 Environment Sustainability

Environmental sustainability is where the biggest actual problems lie. To achieve environmental sustainability the environment needs to support a defined level of environmental quality and natural resource extraction rates at a level which will not lead to environmental degradation. However, often the environment is considered the lowest priority when there are problems to be solved, but in reality, it underpins social and economic sustainability.

To achieve environmental or ecological sustainability, we must use resources sustainably so they can replenish. To explain this, we can look at the work of Herman Daly who was an economist who looked at the maintenance of natural capital. His theory of a 'Steady State Economy' is explained in the table below.

Consumption of Renewable Resources	State of the Environment	Sustainable or Not	
More than nature's ability to replenish	Environmental degradation	Not sustainable	
Equal to nature's ability to replenish	Environmental equilibrium	Steady State Economy	
Less than nature's ability to replenish	Environmental renewal	Environmentally sustainable	

5.4 Activity 7 - What does Sustainable Development mean to me?

Watch the 3 short video clips about sustainable development from the links below.

https://www.bing.com/videos/search?q=sustainable+development&&view=detail&mid=7041437 E8D26D374857A7041437E8D26D374857A&rvsmid=53C8CA5692303456660053C8CA569230345666 00&FORM=VDRVRV https://www.bing.com/videos/search?q=sustainable+development&&view=detail&mid=1B5CB76 10FE917E7B87F1B5CB7610FE917E7B87F&rvsmid=53C8CA5692303456660053C8CA5692303456660 0&FORM=VDRVRV

https://www.bing.com/videos/search?q=sustainable+development&&view=detail&mid=B1E2109 DCCB9B2882DB0B1E2109DCCB9B2882DB0&&FORM=VDRVRV

Now that you have some information about sustainable development and sustainability, write a short paragraph about what sustainability means to you.

The last video clip introduced the importance of 'cultures' for sustainability. How do you think your 'culture' has shaped your beliefs about sustainable development?

6. Environmental Ethics

We have already looked at rights and responsibilities, where we touched upon moral responsibilities, however we will now look at morals and ethics in relation to sustainability and the environment in more detail.

6.1 Ethics, Behaviours and Morals

Until recently, ethics would normally only be associated with humans, but environmental ethics looks to understand the relationship between human beings and the environmental and extend concerns to include the non-human world, both now and in the future. This is important for a number of reasons including:

- Everything on Earth is interconnected.
- Our actions now have future consequences.
- Human life is only possible if there are the right conditions on Earth.

Therefore we need to ask difficult questions such as:

- Who is responsible for climate change and environmental degradation? Who will suffer as a result of them and who should pay to resolve these issues?
- Should we limit population growth?
- What about other species and the environment, what are their rights? Should they have rights?
- Is it right for humans to knowingly cause the extinction of another species for our convenience?
- What about future generations, should we consider the rights of people not born yet?

If we come up with answers about who is responsible for environmental degradation, how do we make them pay? If we decide other species and the environment do have rights, how do we implement them? How do we protect the natural environment, conserve other species, and not use all of our natural resources so they are available for future generations. How do we ensure we do not pollute the atmosphere or oceans, or degrade the soil making it difficult for future generations to grow food?

MORE IMPORTANTLY, WHO MAKES THESE DECISIONS?

Should these decisions be made by governments? This is why democracy is such an important part of sustainability.

All of this involves changing our behaviour, and this can be very difficult to do. Both, to implement ourselves and to convince others they may need to change their behaviour.

6.2 Activity 9 - Behaviour Change: 'Let's Ban the Bead!'

Go to the 'Story of Stuff' website and watch the micro beads video 'Lets Ban the Bead!' Available at <u>http://storyofstuff.org/movies/lets-ban-the-bead/</u>

How would you convince people to change their behaviour to address the issues raised in the 'Lets Ban the Bead!' video? Summarise in bullet points below to support your arguments:

- •
- •
- •
- •
- •

6.3 Animal Testing and Ethics

It is not only how we treat people that causes us to ask ethical questions about rights and responsibilities. The treatment of other species in the form of animal testing also comes under the ethical spotlight. To explore this in a bit more detail, we will take the case of animal testing in the cosmetics industry. Due to the strong public backlash against cosmetic testing on animals, most cosmetic manufacturers now say their products are not tested on animals (so a moral argument). However, they are still required by trading standards and consumer protection laws in most countries to show their products are not toxic

and are not dangerous to public health (rights and responsibilities due to legislation). They are also required to prove that the ingredients are not dangerous in large quantities, such as when they are in transport or in the



Lush against animal testing – available at https://www.lush.co.uk/

manufacturing plant. It is not always easy to distinguish which brands are cruelty-free and which are not because many companies do not clearly label their products, and some companies make ambiguous statements when referring to theirs. For example, a bottle of shampoo claiming, "this product has not been tested on animals," may not be telling the full story. It may mean the finished product had not been tested on animals but some of the ingredient may have been. Also, chemicals designed for other industries, such as for pharmaceuticals or manufacturing, but that are then used in some cosmetics may have been tested on animals. Another issue associated with animal testing is that the results may be limited as the effect on humans may be different from the effect on the animal the product was tested on. Therefore, animal testing may be unreliable and ineffective and human safety cannot be guaranteed. Alternatives to animal testing using human skin cells and computer models can offer more reliable results and be conducted much quicker making them more cost-effective than tests that use animals.

In some countries, it is possible to meet the safety requirements needed without any further tests on animals; however, in other countries animal testing is required to meet their legal requirements. We can look at some different countries for examples of this.

The European Union (including the United Kingdom)

It is illegal to use animals to test cosmetic products or any of their ingredients in the UK and all other member states of the European Union. Also since March 2013, it is also illegal to sell cosmetic products in all European Countries which have been tested on animals, or which contain ingredients which have been tested on animals.

The United States of America

The United States of America has frequently been criticised for their insistence on stringent safety measures, which until recently often required animal testing. However, many retailers in the USA did take a stance against animal testing and would declare this to distinguish themselves from other retailers that did not. In March 2014, the Humane Cosmetics Act was introduced to the U.S. congress which would ban cosmetic testing on animals and eventually would ban the sale of cosmetics tested on animals. However, it will take a number of years for all of these changes to be implemented.

China

The Chinese government conducts mandatory animal testing on all cosmetics imported into the country. They also until recently conducted random animal testing on cosmetic products pulled off shelves; however, from June 2014 there is no longer mandatory testing of domestically produced cosmetic products. Therefore, even if a product has not been tested on animals by the manufacturer that produced it, if it is sold in China it cannot be classed as cruelty free. A further problem is that China is a huge marketplace and every brand will want to sell in China because of this. If animal testing could be eliminated for all cosmetic brands sold in China this would make a huge difference and would nearly eliminate all cosmetic testing on animals globally.

Australia

In Australia, the End Cruel Cosmetics Bill was introduced in March 2014, which would ban local testing and stop the development, manufacturing, selling, advertising or importing into Australia cosmetics, or ingredients for cosmetics, which have been tested on live animals after the commencement of the Bill. The Bill has now passed Senate and the next stage is for legislation to make the Bill law.

Israel

Since the start of 2013, Israel has banned the importing and marketing of all cosmetics, toiletries or detergents that were tested on animals.

India

In 2013, India followed Israel to become the second country in Asia to announce a ban on testing cosmetics on animals.

From this brief snapshot it can be seen that progress is being made. However, remember there is **STILL NOT A GLOBAL BAN.**

Looking at the legislation advised above, it is also worth considering what changes or progress, if any, has been made over time to move further towards greater protection for animals against testing.

Much more information about the human treatment of animals, including testing for the beauty industry, is available on the People for the Ethical Treatment of Animals (PETA) website, available at http://www.peta.org.uk/

6.4 Fair Trade and Ethics

Another ethical concern you may have about the production of personal care and beauty products is whether they are truly green in terms of where they have been produced and that the producers and suppliers, particularly if they are in developing countries, have not been exploited. The Fairtrade Foundation has developed certification so you can be confident that the producers have been treated fairly.

Producers that supply Fairtrade products are inspected and certified by the international certification body Fairtrade Labelling Organisations International (FLO). They receive a minimum price that covers the cost of sustainable production and also an extra amount of money is invested in social or economic development projects in their communities. Fairtrade Labelling was created in the Netherlands in the late 1980s and today the FLO co-ordinates Fairtrade Labelling in 20 counties including the UK.

You will recognise certified products because they carry the FAIRTRADE mark. This is their consumer label which guarantees that producers, workers and communities in the developing world are getting a better deal.

As well as Fairtrade there are a number of organisations which address sustainability, including social justice, ethics and animal rights within the beauty industry. Below are a few examples, however if you search the internet you will find many more.

Join our Ethical Beauty Revolution!



For more information about ethical beauty products, have a look at the website below:

http://www.phbethicalbeauty.co.uk/about-phb

So far we have only considered animal testing on products we will use for beauty and personal care purposes. However, here is another ethical dilemma to think about when considering animal testing for human gain.

What about animal testing for drugs that can save human lives – whose life is more important? The animal or humans?

6.5 Activity 8 - The 'Ethical' Debate

Split the group into two teams. One team is the proposition and argues in favour of the motion, the other team is the opposition and they argue against the motion. The motion should be based on one of the topics highlighted in this chapter. Possible motions could be:

- Nuclear power is ethically better for the planet because it does not generate greenhouse gas emissions, which contribute to climate change, as burning fossil fuels do.
- People in developed countries should decrease their carbon footprints so that people in developing countries can increase their standard of living.
- Animals should have the same rights as people.
- The United Nations Millennium Development goals were a 'Utopian dream' that were impossible to achieve.

This is not an exhaustive list and you should be able to think of many different examples of areas you would like to debate in class.



7. Climate Change, Sustainable Development and Health

Climate change will have many impacts upon our ability to achieve sustainable development. Climate change will directly affect all 3 pillars of sustainable development, social, environmental and economic. Climate change will also have severe impacts upon human health globally, however it will affect the poor to a greater extent. It will also affect those who cannot speak up for themselves more, not only the poor, but other species and future generations. All of the following examples will also have global health implications. Below is just a snapshot of some of the problems we will face due to climate change. If you investigate this further you will find many more.

Changes to sea levels:

- Additional water from melting glaciers, icecaps and ice sheets.
- Thermal expansion of oceans.



Tuvalu, South Pacific

- Coastal erosion affecting coastal cities.
- The loss of low lying islands.
- Greater hurricane frequency. •
- Loss of habitats.
- Financial impacts.







Other impacts on coastal systems:

- The loss of mangroves and salt marshes.
- Coral bleaching.







The Himalayas

Impacts upon freshwater resources:

- Glacial melt water loss from retreating mountain glaciers.
- Hydrological stress including more droughts but also flooding.

Impacts upon biodiversity:

- Changes to phenology.
- Changes to species range and distribution.
- Loss of species.
- Impacts upon global agriculture.





Impacts upon human health:

- Direct impacts of extreme heat or cold
- Vector borne diseases.
- Food and water borne diseases.
- Pollen and dust related diseases.



Lyme disease tick

Increases in Lyme disease in Sweden may be due to milder winters (Lindgren & Gustafson (2001)



Summer of 2003 – Approximately 15,000 heat related deaths in France alone. (Met Office 2010)

Bacterial infectious diseases can be sensitive to temperature



Salmonella bacterium

- Consider all of the impacts shown above as a result of climate change caused by human actions.
- Some obvious health issues have been highlighted, however by doing some further research establish what the health implications are for each issue raised.
- Health issues will be social issues because they affect people. However, think about how health issues are also economic and environmental issues.
- There are not only health issues, think also about the environmental and economic issues

7.1 Activity 10 - Health Issues associated with Personal Care Products

Whilst palm oil and petroleum have associated environmental issues associated with them, they are naturally occurring raw materials. Other raw materials found in beauty and personal care products are manufactured in laboratories and have their own impacts upon the natural environment, other species and sometimes our health, and have even been listed as carcinogens, reproductive toxins and hormone disruptors.

These chemicals include:

- Triclosan
- Sodium laureth sulphate
- Polyethylene glycols PEGs
- Diethanolamine DEA
- Phthalates
- 1,3-butadiene
- Polyethylene terephthalate



QUICK QUIZ – 'google' each of these chemical compounds to see what they are used for in beauty and personal care and some of the potential associated health and environmental problems that may be caused by their use

7.2 Environmental Impacts of Deforestation

The establishment of vast monoculture palm oil plantations has many environmental impacts, one of which is deforestation. Many medical drugs are found in the rainforests, some of which we have managed to manufacture and now have man-made copies, but not all. So what about lost opportunities for future drugs, future cures for diseases that may be lost if we don't preserve our rainforests.

Large Scale Forest Conversion

Palm oil trees grow in tropical areas in countries such as Indonesia and Malaysia. Indonesia and Malaysia are islands with some of the most biodiverse tropical forests anywhere in the world. However, in recent years, there has become a direct relationship between the growth of palm oil estates and deforestation on these islands. As a result, vast plantations now cover large areas in these regions, on land that was previously covered in high conservation value tropical forests. These forests were considered of high conservation value because not only did they have the most species of trees per hectare, but they were also home to a high number of other plant and animal species as well. Even more worrying is the fact that demand for palm oil is predicted to increase and most of the area on these islands left which is suitable for palm oil production also happens to be of high conservation value tropical forests. This loss of tropical rainforests brings us on to our next area of concern.

Loss of Critical Habitats

Loss of species habitats in Indonesia and Malaysia for palm oil plantations causes severe problems for the insects, plants and animals that would usually live there. However, loss of habitats for palm oil plantations is not only a problem in Indonesia and Malaysia. Over the last twenty years it has been estimated that the Amazon rainforest has lost nearly 800,000 square kilometers, this is around the same size as two Germanys. Although deforestation in the Amazon rainforests is not only due to palm oil plantations, but also for other reasons such as logging, palm oil production does contribute significantly to deforestation of the Amazon rainforests. The loss of Amazon rainforests not only impacts on other species but also has other consequences. The Amazon works as a giant pump as it channels moisture inland through a network of smaller tributary rivers. This helps rainclouds form over the forest areas which maintains the moisture levels required for the tropical forests to thrive. The Amazon rainforest also acts as a buffer zone against extreme weather events such as tornados and hurricanes, helping to protect people and infrastructure. Also, there is the potential to lose possible future medical cures. It is estimated that over the last 20 years the Amazon rainforest has decreased in size by nearly 800,000 square kilometers.

To put this into perspective, this is around the size of two Germanys. The diagram below highlights the size of Germany compared against the United Kingdom.



7.3 Activity 11 – Other Impacts of Deforestation

Using the internet, search the impacts listed below to find out how deforestation in the Amazon Rainforest, and other rainforests around the globe, contributes to the following:

- Soil erosion and pollution
- Air and water pollution
- Climate change
- Loss of biodiversity
- Social and ethical problems
- Health impacts.

The results can either be presented as a group project to the rest of the class, looking at a number of the impacts, or as an individual piece of work choosing one topic and designing a poster or PowerPoint presentation to highlight the associated impacts of that topic.

8. Calculating Energy Consumption

8.1 Electricity - Understanding Watts and Kilowatt Hours

When we look at anything that runs on electricity, such as a kettle of a television, there is usually a label that tells us how energy hungry it is - this is the number of watts (W) the piece of equipment uses – or its 'wattage'. Have a look at electrical equipment in your home/class to identify the wattage information.

To calculate how much energy is used by any electrical item we can do some simple calculations. We will look at an example of electricity consumption using light bulbs to begin with.

Stage 1

If there are 8 light bulbs in a classroom and each light bulb is 100 W, then to find out the total wattage of the lights you need to multiply the number of bulbs by the wattage:

Total wattage (8 bulbs) = 8 x 100 W = 800 W

Stage 2

To work out the **'watt hours' (Wh)** that a piece of equipment uses, we need to know the wattage and the number of hours it is turned on for.

Watts x hours = watt hours

Stage 3

Then to find out how many kilowatt hours this is, we divide the number of watt hours by 1000:

Watt hours ÷ 1000 = kilowatt hours

For example, if the eight 100 watt bulbs in the classroom are turned on for 5 hours, then:

800 watts x 5 hours = 4000 watt hours 4000 watt hours ÷ 1000 = 4 kilowatt hours

To calculate how much energy the classroom uses for lighting in a year, we need to estimate how many hours the lights are turned on for in a year. To do this we need to estimate the number of hours they are on per day, the number of days they are on per week, and the number of weeks per year.

The classroom lights are usually on for 8 hours per day, there are 5 days in the college week, and 40 college weeks per year, so the lights are on for:

[8 hours/day x 5 days/week x 40 weeks/year = 1600 hours/year]

And the energy they use in a year is:

```
800 W x 1600 hours/year = 1,280,000 Wh/year
1,280,000 Wh/year ÷ 1000 = 1280 Wh/year (kWh/yr)
Based on an average electricity unit price of £0.10, 1 kWh costs £0.10
Therefore, 1280 kWh/yr costs 1280 x £0.10 = £128.00
```

This means to light one classroom during working hours for one year, using 8 100 W bulbs costs the College **£128.00**

8.2 Activity 12 - Changing Light Bulbs

The College has low energy fluorescent lighting in each classroom. Each light fitting contains two 35 W bulbs, and there are 11 fittings in the salon. Prior to moving into a new College building, the classrooms at the old building used light fittings with 100 W bulbs, with 15 of these bulbs in each room. Therefore, how much energy and money did the College save when they moved to the new building by changing the bulbs in each classroom?

Hint: Estimate how many hours the lights are on each day based on an eight hour day. Remember there are 5 college days in a week, and 40 college weeks in a year, so there are 200 college days in a year.

	Wattage	Number	Total watts of	Hours on per	Hours on per	Kilowatt hours of
	of 1 bulb	of bulbs	all bulbs [W]	day	year	energy per year
	[W]			[hours / day]	[hours / year]	[kWh / year]
Old	100	15	100 W x 15	8	8 hours x 200	1500 W x 1600
bulbs			bulbs =		days = 1600	hours =
					hours	2,400,000 W
			1500 W			hours ÷ 1000 =
						2400 kWh / year
New	35	22	35 W x 22	8		
bulbs			bulbs = 770 W			
l		Savings			Savings	
		Ū				

Remember: (watts x hours per year) ÷ 1000 = kilowatt hours per year

Q1 Therefore how many kWh of electricity have been saved in a year in one classroom by changing the bulbs? _____ kWh / year

Remember: the average cost of 1 unit of electricity costs the College £0.10

1kWh of electricity costs £_____ Therefore, a reduction in use of ______kWh saves £______a year

Q2 The new College building has 8 classrooms in each corridor, therefore how much electricity and money has the College saved by changing the light bulbs in all classrooms along one corridor?

One classroom means a reduction of ______ kWh / year, so 8 classrooms means a reduction of ______ kWh / year

One classroom saved £_____ a year, so 8 classrooms saved £_____ a year

8.3 Activity 13 - Energy Use at Home

Look around your home and choose five pieces of electrical equipment you can find the wattage easily for. Remember, for many items this can be found on a little panel, failing that you can find the wattage in the manufacturer's guide, if you still have it, or by searching on the internet (a good site is <u>www.sust-it.net</u>). The items can be anything electrical, for example, a television, kettle, microwave, or even something more unusual such as an electric drill.

Hint: Once you have selected your electrical equipment, make an estimate of how many hours a day on average it is switched on and then complete the following table. The first line has been completed as an example.

Type of equipment	Make and model	Wattage [W]	Hours of use per day [hours / day]	Hours of use per year [hours / year]	Kilowatt hours of energy per year [kWh/year]
Television	Sony KDL 32EX603 32"	80	4	4 x 365 = 1460 hours / year	80W x 1460 hours = 116800 Wh ÷ 1000 = 116.8 kWh/year

Remember: there are 365 days in a year

Q1. What is the most energy intensive piece of equipment you found? Remember this is the piece of equipment with the highest wattage.

Q2. Which piece of equipment consumes the most electricity per year?

Q3. Were you surprised by any particular result? If so, what is the piece of equipment and why were you surprised?

Q4. Can you think of an example of an electrical item that you could substitute manpower for and still achieve the same result?

Q5. What room in your house do you think is the most energy intensive in terms of electricity? Why do you think this is?

Q6. Take the piece of equipment with the highest electricity consumption and search the internet for a less energy intensive alternative. What did you find?

Q7 Electricity aside, can you think of any other ways energy is consumed by your household?

9. Water Use

Water is essential for all living things on Earth, however it is a resource we take very much for granted in Scotland where we rarely have water shortages. Due to this, we do not always consider water as a finite resource and that not everyone in the world has access to readily available clean water, as we do. In 2007 the average Scottish person used 146 litres of water per day, which is 6% more water per person per day than we used 20 years ago (Scottish Water).

9.1 Water Conservation

It is difficult to appreciate the need for water conservation when it rains so often in Scotland. However, even in Scotland, the lack of rain sometimes means we can experience water shortages and this will become more common in summer months in the future due to climate change. This is already a reality in many places around the world, and as global average temperatures rise, this will only get worse. By 2025, it is estimated by the World Wildlife Federation that 5.5 billion people around the world, 67% of the population, will live in areas where drought, as a result of climate change, will make water scarce. There are already conflicts over water in some areas of the world, for example some communities' water supplies are disrupted due to water being required for golf courses for wealthy tourists.

As a result of this we should be conserving water wherever possible. There are a number of easy ways to conserve water around the home and garden. Here are just a few examples:

- Only use your washing machine and dishwasher when they are full
- Keep a pitcher of water in the fridge for cold drinks instead of running the tap.
- Water your garden in the morning and evening when temperatures are cooler to minimise evaporation.
- Wash fruit and vegetables in a pan of water instead of running the tap and then reuse the water on houseplants.
- Wash dark clothing with cold water on a short cycle which reduces water and energy used and also helps your clothes keep their colour.
- Take showers instead of baths and reduce the time spent in the shower.
- Install a water butt in the garden to collect rainwater for watering the garden.
- Fix any dripping taps.
- Don't wash your car yourself instead use a commercial car wash that recycles water.



Some other changes are not so straightforward and inexpensive to implement, however they can save money in the long run. Technology can be used for water conservation, for example there are taps available which reduce the amount of water that flows from them and there are washing machines which use a lot less water per load than standard ones. If you need to replace such equipment in a beauty salon, or even in your own household, it may be worth considering



alternatives that use less water, especially if this leads to reduced water bills if your water is metered, as most businesses are, which can reduce your overall business costs.

9.2 Activity 14 - Water Calculator



It is possible to calculate your water footprint within your

home, just like earlier in the workbook when you calculated your carbon footprint. Calculate your water footprint at:

http://www.energysavingtrust.org.uk/resources/tools-calculators/water-energy

Were you surprised by the amount of water consumed in your home?

9.3 Water Resources and Climate Change

Climate change will affect global water resources. Whilst an increase in global precipitation is expected, the regional patterns of rainfall will vary, meaning some areas will have more rainfall, while others will have less. There are high levels of uncertainty about how the pattern of precipitation will change but areas where agriculture is dependent on seasonal rainfall, like the Indian and West African monsoons, are particularly vulnerable. If monsoon patterns change or the monsoons weaken, millions of people could face food shortages.

Changes in climate and increases in some extreme weather events, such as floods and droughts, will disrupt the stability of the food supply, as well as people's livelihoods, making it more difficult for them to earn a stable income to purchase food. Some areas may face droughts with changing rainfall patterns, for example, in the Himalayas people are dependent upon seasonal melt water from glaciers which provides drinking water during the dry season. Climate change is causing glaciers to retreat which will endanger their fresh water supply as well as increase flood risks during the rainy season. Other problems associated with decreased water availability and quality in some areas, are increased health and sanitation problems, such as diarrhoeal disease and changes in the patterns of vector-borne disease, which can result in increased levels of malnutrition.

Unfortunately, many of the regions which are likely to be affected are in developing countries where the cost of climate change will be borne most by the poor. People in developing countries are highly dependent on rain fed agriculture for food security so they are particularly vulnerable to changes in annual precipitation levels. Also, because the poor have very limited resources they do not have the ability to adapt to climate change impacts like we can in wealthier industrialised nations.

There are also other indirect impacts of climate change upon water resources. Climate change is not only causing melting ice, but an increase to global temperatures means thermal expansion of the oceans causing sea levels to rise. Rising sea levels leads to salt water intrusion into groundwater supplies, which threatens the quality and quantity of freshwater which will impact large percentages of the population.

10. Food

It should already be evident to you, from calculating your carbon footprint, that one of the major contributors to our ecological and carbon footprints is the food we consume. But how do our eating habits have such a great effect on our ecological and carbon footprints? The easiest way to explain it is to look at an example of an everyday snack or lunch we may enjoy.

Taking a bacon, lettuce and tomato (BLT) sandwich as an example, where do all of the ingredients come from?



Source: Adapted from the Teachers pack School Global Footprints (WWF Scotland, 2006).

We can see from the example above, just how far our food often travels before it ends up on our plate. In the last section on transport, we calculated the amount of greenhouse gas emissions that resulted from different forms of travel. Therefore, it should be evident that if we were to consume less food grown in other countries and transported to the UK, and eat more food produced in the UK, this would reduce the carbon footprint of our food consumption. However, it is not always this straightforward. What would we do if we wanted fresh strawberries in January or pineapple at any time? Should we only eat seasonal fruit and vegetables that can be grown in the UK without the need for energy intensive hot houses?

10.1 Environmental Impact of Food

As we have seen, everything we eat has an impact upon the environment however there are steps we can take to help reduce the environmental impact of food, including the following:

- Shop locally and if possible, leave the car at home
- Plan one big trip if using a large supermarket instead of going two or more times per week
- Buy locally grown produce when it is in season
- Avoid food which is over packaged whenever possible
- Buy organic produce
- Buy fair-trade goods which support third world communities and are usually transported by sea

10.2 Fair Trade and Food

Fair Trade has gained in popularity over recent years in our shops and supermarkets, especially with specific goods such as tea, coffee, cocoa, chocolate and bananas. The purpose of Fair Trade is to provide justice and equality for the small independent producers and the workers on plantations. The plantations are located in developing countries where workers are often exploited. In the past many of these farmers and workers were paid low wages and forced to work in poor conditions meaning they had to live in poverty. All of this meant they had little opportunity to improve their situation. Fair Trade aims to reverse this trend by ensuring there are standards in place for working conditions, and by implementing prices for traders and consumers. This means the farmers and workers are paid a fair wage. Fair Trade also ensures that the welfare conditions for the workers are acceptable, that children are not employed who should be in school and that farming practices are sustainable.



When we think of Fair Trade products, some of the first things that spring to mind include tea and coffee, or chocolate and bananas, none of which grow in the UK. Therefore, sometimes we need to think about compromising one belief or value we have, to support another. In this case the carbon emissions to transport these goods around the world, versus the need to help communities in developing countries support themselves and receive a fair income.

There may be other areas apart from Fair Trade where you may choose to compromise; especially in terms of the money you have available to spend, in order to support an environmental belief. For example, it is more expensive to buy free range chicken than battery farmed, which means you may choose to eat the more expensive free range chicken once a week instead of the cheaper alternative more often. Another example is looking for tuna that is pole and line caught which is more

expensive than standard tins of tuna which have been caught by a process called purse seining. This involves huge nets which catch everything in the marine environment, including sharks and turtles (and sometimes even dolphins, although they state on the tin they are 'dolphin friendly'). These other species are then discarded as by-catch and thrown back into the sea dead.

10.3 Activity 15 – Environmental Impacts of Food Production

Decide what your favourite meal is, whether this is a burger, a curry, or fish and chips, and think about what the environmental implications could be of producing that meal. Use the internet to search for the implications of the ingredients within the meal. Think about where and how the ingredients are grown and how they reach the supplier you have purchased them from.







11. Waste





There is a limit to the amount of waste the Earth can absorb. When we look at a product and the waste it generates, we need to look at it from cradle to grave. This is why we have looked at products so far starting with the raw materials they are made from and ending with the disposal of the item. In order to reduce the amount of waste we produce, we need to reduce the number of products we consume. We have more money to buy more 'stuff' and as we like new 'stuff' we are always buying more. Also, products are not made to last like they were in the past. Our grandparents would 'make do and mend' whilst we just throwaway and replace. Economies of countries are driven by producing and selling more materials, so to make products that last longer does not make economic sense.

Packaging is a major source of waste. The minute we remove it from a product waste is produced. One way to reduce the amount of packaging is by consumers putting pressure on suppliers to not over package their goods. This may be difficult for an individual, however if you are responsible for purchasing products on a large scale for an employer or your own business, this may then become possible. It is also worth investigating if a supplier has an environmental policy and, if so, what it consists of, before deciding to use that supplier. As was established in the section on the life cycle analysis of a product, we should consider waste impacts from 'cradle to grave' for a product. If we produce and use less packaging, this means there are less raw materials required to make the packaging and less energy being used. Less packaging also means less waste to recycle, which also uses energy, or less waste to send to landfill.

Some of the waste produced in the College, for example in the hair and beauty salons or the workshops, is not only a concern due to the disposal of packaging but also due to disposal of the chemicals used in the products. Chemical waste causes pollution, which can be either point source or non-point source. Point source pollution is usually defined as pollution where the origin can be defined from one source, such as at the end of a pipe. Non-point source pollution is caused indirectly by chemicals leaking into groundwater. If disposed of incorrectly, chemicals can cause pollution to our environment by leaching into our groundwater from landfill sites. This can have a negative long-term effect on human health and also impacts upon plants and animals.



Point Source Pollution



However, attitudes towards waste in our society are changing. The best way to minimise the amount of waste we produce is to reduce the amount we produce in the first place. Failing this the next best option is to re-use it wherever possible and if this is not possible then recycle it. Most of you will probably be familiar with this concept already:

Reduce the amount of waste we produce

(For example, by manufacturers using less packaging on products or by consumers buying re-fill packs which use less packaging. Consumers can also put pressure on manufacturers and retailers to use less packaging.)

Reuse packaging or waste wherever possible, either for the same purpose or find a new use for it

(For example, save last year's Christmas cards and wrapping paper. Wrapping paper can be used again and Christmas cards can be cut up and used as name tags or decorations. Old magazines and newspapers can be used as wrapping paper with some pretty ribbon or bows added).

Recycle break your waste down and reprocess it

(However, remember this uses further energy and some items cannot be recycled because of toxic chemicals in them or because they may have manufactured from different materials squashed together).

So, most of us are familiar with the message reduce, re-use, recycle. However, this can also be added to with:

Repair broken items instead of discarding them and buying new ones

(For example, with our clothing, skills such as sewing are not so prevalent nowadays as they were in the past when clothing items would be mended instead of discarded. Also have shoes re-heeled or re-soled where possible instead of throwing them away).

Refill empty containers

For all non-renewable resources such as metals, glass and plastics, we need to remember, as they

say in the supermarkets for special offers 'when it's gone, it's gone'.

The Earth is a closed system and once these materials have been used up the Earth can't make any more of them within human timescales.

Another way to view the elimination and reduction of waste in any business or in our everyday lives is as follows.

Waste Hierarchy



- PREVENTION do not produce the waste in the first place (this may be difficult for beauty products as they generally need to be placed in a container of some sort, however additional packaging for transportation may be eliminated)
- MINIMISATION using less material in design and manufacture, designing products for a longer life and using less hazardous materials
- **REUSE** clean and repair in order to be reused (glass nail polish bottles and plastic containers for example)
- RECYCLE turning waste into new products (recycling plastic beauty packaging into new beauty packaging)
- **RECOVERY** producing energy from waste through anaerobic digestion, incineration with energy recovery, pyrolysis and gasification which produce energy fuels (this can be applied to packaging waste)
- DISPOSAL landfill and incineration without energy recovery (the last resort for any packaging waste)

11.1 Sustainable Procurement

One way to help address the waste problem, is to look at how companies manufacture their good and products and to encourage more sustainable procurement within colleges. Increasingly individual consumers and businesses are asking for products that fit with a more sustainable ethos. From the ingredients within the product to the packaging it comes in. Some manufacturers are also starting to consider how their products can have less of an environmental impact. One solution starts with product design and manufacture in order to make recycling and reusing components easier and a natural part of the process. This can be shown in the Coca Cola example below from The Ellen MacArthur Foundation which actively promotes the circular economy as a way of designing and manufacturing goods in a more sustainable manner. In a nutshell, a circular economy is as described in the definition below.

A circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life.



More information about The Ellen MacArthur Foundation and the circular economy is available at http://www.ellenmacarthurfoundation.org/

Coca Cola are not the only company taking this approach and increasingly more companies are doing this with their packaging. In the beauty and personal care industries, a good example is Lush whose ethos included naked packaging. This is where they actively try to avoid packaging wherever possible. However, where packaging is unavoidable they prefer to use recycled materials and as much as 90% of their packaging is recycled and they are working on the remaining 10%. They are aiming to have 100% of their packaging to be either recyclable or compostable. If Lush can do it then so can other companies. Only by consumers demanding products such as this through procurement will companies take notice and change.

Visit the Lush website to learn more, not only about their recycling policies but also about their overall sustainability ethos including ethical buying and fighting against animal testing.

https://www.lush.co.uk/

11.2 Activity 16 - Waste Generated in our Everyday Lives

Think of the products and materials that are used in an everyday household and make a list of the waste you think is generated within a normal week. If possible think of how this waste could be eliminated, reduced or recycled, or if this is not possible, how would you dispose of it with as little environmental impact as possible? Some examples have been provided to start the table. Use the internet to search for recycling or waste disposal methods, a good site to start with is https://www.recyclenow.com/

Waste Produced	Method to Eliminate, Reduce, Recycle or Dispose
Food waste	Eliminate – only buy what you will use, avoid 2 for 1 offers in the supermarket unless you know you will eat it Disposal – compost where possible
Used batteries	Reduce/eliminate – use re-chargeable batteries wherever possible Disposal – do not put in your household trash, where they can end up in landfill. Contact the council for disposal facilities in your area.

12. And Finally

The last activity is to consolidate all the information contained within the workbook. You can use the information you have learnt from any section of the workbook provided it relates to what is being done in your curriculum area to tackle sustainability issues.

12.1 Activity 17 - Poster Competition

Design a poster to advertise what is happening in your college to promote sustainability. The project can be related to any aspect of your college life, whether this is a class project, a Citizenship project or a cross college project your class is engaged in. Ask if the winning designs can be made into artwork and displayed around the college. The poster below may give you an idea of what is required. This poster was designed in Dumfries and Galloway College and used as part of a campaign to promote the use of reusable mugs. Using reusable mugs instead of paper cups stops paper cups ending up in landfill sites, and saves the resources that were required to make them in the first place, such as wood and water.

To give you some ideas, here are some topics your poster could be about:



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