The Centre for Global Education has a collection of resources for Key Stages 1–4, available at www.centreforglobaleducation.com

This resource has been funded by the Department for International Development.
Science
A Global Dimension

Introduction
Science is a global activity with consequences for all our lives. It is a human activity with ethical, social and political dimensions. The impact of science is not confined to scientists or laboratories; it affects the daily interactions and behaviours of people everywhere.

Science education provides opportunities to relate technological change to changes in a wider context, such as effects on:
- the environment;
- local and global communities; and
- our quality of life.

Globalisation affects our daily lives more and more. It is vital for science education to reflect the global dimension.

Incorporating the global dimension into science teaching provides opportunities to explore the diverse cultural roots of science. It can add to pupils’ understanding of the impact of science globally. The global dimension is also about giving pupils opportunities to consider complex and controversial issues, that impact on people both locally and globally, from the perspective of others.

What is the Global Dimension?
The Global Dimension incorporates the eight key concepts of global citizenship, conflict resolution, diversity, human rights, interdependence, social justice, sustainable development and values and perceptions. It explores the interconnections between the local and global. It builds knowledge and understanding, as well as developing skills and attitudes (DFES, 2005). For more on the Global Dimension key concepts, please go to page four of this resource.

We have written this resource to help teachers to support the Global Dimension in science. Pupils are encouraged to explore these issues through the lens of the Global Dimension, using the eight key concepts.

We have divided this resource into three sections:
- A Bias in Science?
- Mobile Phones—The Good, the Bad and the Ugly; and
- Water.

It includes a number of suggested activities based around these topics.

The activities in this resource can address some of the Statutory Requirements for Science at Key Stage 3:

**Key Element: Moral Character**
Recognise and challenge over-simplistic or distorted generalisations about science with informed and balanced responses and take responsibility for choices and actions.

**Key Element: Ethical Awareness**
Explore some ethical dilemmas arising from scientific developments.

**Key Element: Cultural Understanding**
Consider how the development of scientific ideas, or theories, relate to the historical or cultural context.

At the beginning of each section you will find:
- reference to the relevant key concept(s) of the Global Dimension;
- a summary of the key terms to use in each activity;
- suggested Learning Intentions;
- reference to the strands in the Thinking Skills and Personal Capabilities Framework and the Cross-Curricular Skills that may be developed in the activities.

**Key Learning Outcomes**
The activities in this resource should give pupils opportunities to consider the Global Dimension in their learning. By the end of the activities pupils should:
- have greater understanding of the global and historical nature of the development and advancement of science;
- be aware of the problems of using ‘conflict minerals’ and the humanitarian aspect of technological goods production; and
- have a greater understanding of the importance of water conservation and the concept of access to clean water as a human right.

**Guidance for Teachers**
Teachers should use their professional judgement to decide how much detail is appropriate for their pupils. Where practicable, the resource lists alternative sources of information and other resources. A number of fact sheets are also provided for use as appropriate.
Contents

Background for Teachers: The Key Concepts 3

Activities

Section 1: A Bias in Science? 8
Introductory Activity: Imagine a Scientist 9
Activity 1: All Mod Cons? 10

Section 2: Mobile Phones –
The Good, the Bad and the Ugly 12
Introductory Activity: Mobile Phones – Good or Bad? 14
Activity 1: Gold and the 3 Ts 14

Section 3: Water 16
Existing Resources for ‘Water’ 17
Activity 1: Water Wars 19
Activity 2: A Human Right or a Commodity? 20
Activity 3: Time for Action 23

Resources

Pupil Resources
Resource 1a: All Mod Cons? 24
Resource 1b: All Mod Cons? (Answers) 25
Resource 2a: Water Wars Chart 26
Resource 2b: Water Wars Cards 27
Resource 3a: The Millennium Development Goals 29

Fact Sheets
1. All Mod Cons? 30
2. What Makes up your Mobile Phone? 41
3. Conflict Minerals and our Electronic Goods 43
4. Could you Live Without your Mobile Phone? 45
5. Some Water Facts 46
6. The Millennium Development Goals: The Role of Water 47
7. The Millennium Development Goals: Problems and Solutions 48

Teacher Resource
Political Map of Africa 49
The eight key concepts of the Global Dimension reflect some of the issues that individuals and society face, both locally and globally. The eight concepts were developed to provide a framework to help understand the Global Dimension. They are all important and interrelated. However in various contexts, different concepts take a more central position and underpin the others.

In lesson planning, they can be used as ‘lenses’ to look at issues in a range of ways. The Global Dimension spans the curriculum and teaching with the concepts helps keep learning relevant. The Global Dimension is not a discrete subject. It is a lens to explore global issues. It is an opportunity for learning that should permeate the curriculum and the life of the school community.

The Global Dimension contributes to the development of key skills including (cross-cultural) communication, collaborative working, and an awareness of diversity in opinion and perspective. It contributes to critical thinking skills by encouraging pupils to analyse, evaluate, question assumptions and creatively identify ways to achieve positive change.

The Global Dimension in Schools Northern Ireland – Guidance for policymakers offers a comprehensive guide to Global Dimension concepts, research, resources, and its position and context within the Northern Ireland Curriculum. Copies are available on request from The Centre for Global Education: info@centreforglobaleducation.com

More on the eight key concepts:

The Global Dimension in Schools Northern Ireland – Guidance for policymakers

Global Dimension in the Curriculum, NI:
www.globaldimension.org.uk/uploadedFiles/AboutUs/gdw_gd_in_curriculum_n_ireland.pdf

Global Thinking website:
http://global-thinking.org.uk/What-is-the-Global-Dimension.html

Global Dimension website, case studies:
www.globaldimension.org.uk/CaseStudies/?id=56
The Eight Key Concepts of the Global Dimension

The eight key concepts of the Global Dimension provide a structure for exploring issues and asking questions through the lens of each concept.

**Human rights**

- Knowing about human rights including the UN Convention on the Rights of the Child.
  - valuing our common humanity, the meaning of universal human rights
  - understanding rights and responsibilities in a global context and the interrelationship between the global and the local
  - understanding that there are competing rights and responsibilities in different situations and knowing some ways in which human rights are being denied and claimed locally and globally
  - understanding human rights as a framework for challenging inequalities and prejudice such as racism
  - knowing about the UN Convention on the Rights of the Child, the European declaration on Human Rights the Human Rights Act in UK law
  - understanding the universality and indivisibility of human rights

**Conflict resolution**

- Understanding the nature of conflicts, their impact on development and why there is a need for their resolution and the promotion of harmony.
  - knowing about different examples of conflict locally, nationally and internationally and different ways to resolve them
  - understanding that there are choices and consequences for others in conflict situations
  - understanding the importance of dialogue, tolerance, respect and empathy
  - developing skills of communication, advocacy, negotiation, compromise and collaboration
  - recognising conflict can act as a potentially creative process
  - understanding some of the forms racism takes and how to respond to them
  - understanding conflicts can impact on people, places and environments locally and globally
<table>
<thead>
<tr>
<th>Global citizenship</th>
<th>Diversity</th>
<th>Values &amp; perceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gaining the knowledge, skills and understanding of concepts and institutions necessary to become informed, active responsible citizens.</strong></td>
<td><strong>Understanding and respecting differences and relating these to our common humanity.</strong></td>
<td><strong>Developing a critical evaluation of representations of global issues and an appreciation of the effect these have on people’s attitudes and values.</strong></td>
</tr>
<tr>
<td>• developing skills to evaluate information and different points of view on global issues through the media and other sources</td>
<td>• appreciating similarities and differences around the world in the context of universal human rights</td>
<td>• understanding that people have different values, attitudes and perceptions</td>
</tr>
<tr>
<td>• learning about institutions, declarations and conventions and the role of groups, NGOs and governments in global issues</td>
<td>• understanding the importance of respecting differences in culture, customs and traditions and how societies are organised and governed</td>
<td>• understanding the importance and value of human rights</td>
</tr>
<tr>
<td>• developing understanding of how and where key decisions are made</td>
<td>• developing a sense of awe at the variety of peoples and environments around the world</td>
<td>• developing multiple perspectives and new ways of seeing events, issues, problems and opinions</td>
</tr>
<tr>
<td>• appreciating that young people’s views and concerns matter and are listened to; and how to take responsible action that can influence and affect global issues</td>
<td>• valuing biodiversity</td>
<td>• questioning and challenging assumptions and perceptions</td>
</tr>
<tr>
<td>• appreciating the global context of local and national issues and decisions at a personal and societal level</td>
<td>• understanding the impact of the environment on cultures, economies and societies</td>
<td>• understanding the power of the media in influencing perceptions, choices and lifestyles</td>
</tr>
<tr>
<td>• understanding the roles of language, place, arts, religion in own and others’ identity</td>
<td>• appreciating diverse perspectives on global issues and how identities affect opinions and perspectives</td>
<td>• understanding that the values people hold shape their actions</td>
</tr>
<tr>
<td>• appreciating that economic, social and environmental spheres have consequences at different levels, from personal to global</td>
<td>• understanding the nature of prejudice and discrimination and how they can be challenged and combated</td>
<td>• using different issues, events and problems to explore children and young people’s own values and perceptions as well as those of others</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social justice</th>
<th>Sustainable development</th>
<th>Interdependence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Understanding the importance of social justice as an element in both sustainable development and the improved welfare of all people.</strong></td>
<td><strong>Understanding the need to maintain and improve the quality of life now without damaging the planet for future generations.</strong></td>
<td><strong>Understanding how people, places, economies and environments are all inextricably interrelated and that choices and events have repercussions on a global scale.</strong></td>
</tr>
<tr>
<td>• valuing social justice and understanding the importance of it for ensuring equality, justice and fairness for all within and between societies</td>
<td>• recognising that some of the earth’s resources are finite and therefore must be used responsibly by each of us</td>
<td>• understanding the impact of globalisation and that choices made have consequences at different levels, from personal to global</td>
</tr>
<tr>
<td>• recognising the impact of unequal power and access to resources</td>
<td>• understanding the interconnections between the social, economic and environmental spheres</td>
<td>• appreciating the links between the lives of others and children’s and young people’s own lives</td>
</tr>
<tr>
<td>• appreciating that actions have both intended and unintended consequences on people’s lives and appreciating the importance of informed choices</td>
<td>• considering probable and preferable futures and how to achieve the latter</td>
<td>• understanding the influence that diverse cultures and ideas [political, social, religious, economic, legal, technological and scientific] have on each other and appreciating the complexity of interdependence</td>
</tr>
<tr>
<td>• developing the motivation and commitment to take action that will contribute to a more just world</td>
<td>• appreciating that economic development is only one aspect of quality of life</td>
<td>• understanding how the world is a global community and what it means to be a citizen</td>
</tr>
<tr>
<td>• challenging racism and other forms of discrimination, inequality and injustice</td>
<td>• understanding that exclusion and inequality hinder sustainable development for all</td>
<td>• understanding how actions, choices and decisions taken in the UK can impact positively or negatively on the quality of life of people in other countries</td>
</tr>
<tr>
<td>• understanding and valuing equal opportunities</td>
<td>• respecting each other</td>
<td>• understanding how actions, choices and decisions taken in the UK can impact positively or negatively on the quality of life of people in other countries</td>
</tr>
<tr>
<td>• understanding how past injustices affect contemporary local and global politics</td>
<td>• appreciating the importance of sustainable resource use – rethink, reduce, repair, re-use, recycle – and obtaining materials from sustainably managed sources</td>
<td></td>
</tr>
</tbody>
</table>
We have used the terms majority and minority world throughout this resource. The majority world describes economically poorer areas, such as Asia, Africa and Latin America, where most of the world’s population lives. The minority world describes areas that are wealthier, such as Europe, Australia, New Zealand, Japan, USA and Canada, where a minority of the world’s population lives. These terms help us to think about global inequalities and the imbalance of power between these two areas of the world.

Section 1
A Bias in Science?

Background for Teachers
Isaac Newton used the phrase ‘Standing on the shoulders of giants’ in a letter to his rival Robert Hooke, in 1676. The origin of the phrase dates back to the twelfth century theologian and author, John of Salisbury, who used a version of it in a treatise on logic entitled *Metalogicon* in 1159:

’We are like dwarfs sitting on the shoulders of giants. We see more, and things that are more distant, than they did, not because our sight is superior or because we are taller than they, but because they raise us up, and by their great stature add to ours.’

http://tinyurl.com/c7c4j7x

When we think of science, many of us think of European and American scientists (mostly men). We might see science as cutting edge and contemporary – which it intrinsically is – but this might lead some to think that science is relatively modern.

We take a lot of things for granted in the modern world. Over time it becomes easier to overlook the contributions of those who came before us. Humans have made discoveries throughout history. These discoveries can be made by flashes of brilliance, through gradual development, trial and error, or sometimes even by accident. The discoveries we have made have accelerated human progress. Every discovery is built on the foundation of earlier advances.

Much of the scientific knowledge that we take for granted was first developed by scientists and thinkers from around the world. Some discoveries, commonly attributed to modern scientists, have roots further back in history than commonly believed. All of the great empires and civilisations that we know – Egyptian, Persian, Chinese, Roman, Greek – had great thinkers and scientists. These people brought the world technological and scientific advances. The generations that followed borrowed and built on their ideas, adding to our collective scientific knowledge and enabling further advances.

The following learning activities demonstrate how our scientific knowledge builds on preceding advances in science. They show how the dominant scientific model in the minority world has roots in the past.

‘If I have seen further it is by standing on the shoulders of Giants.’

Isaac Newton, 1676

Suggested Learning Intentions
Pupils will have the opportunity to:
- question and explore their knowledge about the origins of selected key scientific developments; and
- explore assumptions and bias about science and scientists.

Key Terms
bias
stereotype
minority world
majority world

We have used the terms majority and minority world throughout this resource. The majority world describes economically poorer areas, such as Asia, Africa and Latin America, where most of the world’s population lives. The minority world describes areas that are wealthier, such as Europe, Australia, New Zealand, Japan, USA and Canada, where a minority of the world’s population lives. These terms help us to think about global inequalities and the imbalance of power between these two areas of the world.
Opportunities for Thinking Skills and Personal Capabilities

Managing Information
Pupils should have opportunities to group, sort and evaluate information.

Thinking, Problem-Solving and Decision-Making
Pupils should have opportunities to:
- develop a line of reasoning; and
- analyse multiple perspectives.

Being Creative
Pupils should have opportunities to:
- develop curiosity; and
- explore.

Working with Others
Pupils should have opportunities to negotiate and influence.

Opportunities for Cross-Curricular Skills

Communication
Pupils should have opportunities to:
- listen to and take part in discussions, explanations, role plays and presentations; and
- contribute comments, ask questions and respond to others’ points of view (Talking and Listening).

Introductory Activity
Imagine a Scientist

This activity addresses any preconceived notion of science/scientists that pupils may have. It may lead to further discussion and activities.

- Ask your pupils to imagine a scientist. Suggest they close their eyes to avoid distractions and help them to visualise. What does the scientist look like? What are they wearing? Where and when are they from? What are they doing?
- Ask your pupils to describe the scientist they visualised. What did they look like? Were they:
  - a man or a woman?
  - from a particular cultural background—for example European or American?
  - from a particular period, for example twentieth/twenty-first century?
  - wearing a lab coat and working in a laboratory?
- Collect pupil feedback and collate it into an overall group consensus.

Biased Conceptions?
Many of your pupils’ descriptions will reflect a number of cultural, racial and gender biases. They may have visualised a scientist as male, middle-aged, European, working in a laboratory with chemicals, possibly with facial hair and glasses. They may use terms like ‘mad scientist’, indicating an element of danger. They are not alone in these notions. If you ask children or adults to draw a scientist, they will depict precisely what people would have described almost 60 years ago. This image of a scientist is dominant in our culture.

Guidance for Discussion

Explain to your pupils that our ideas of what science is and what scientists do are partly shaped by certain aspects of our culture, for example Dr Frankenstein or cartoons with mad or evil scientists. Cultural influences mean we often think of scientists as mostly men, mostly white, and mostly living in modern times. But is this the case?

There are many female scientists who have contributed to their particular fields, for example:
- Marie Curie (and her work on radiation, which led to advances in chemotherapy);
- Jocelyn Bell Burnell (an astrophysicist born in Belfast, professor at Oxford University and Fellow of the Royal Society, who discovered the first pulsar and helped to develop a telescope that used a system of antennas rather than a dish);
- Ida Noddack (a German chemist who first proposed the idea of nuclear fission); and
- Sally Ride (physicist and the first woman in space).

Much of what we take for granted in modern science actually dates back to ancient civilisations, including Mesopotamian, Greek, Chinese, Indian and Egyptian.
Activity 1
All Mod Cons?

Resource 1a
This activity gives pupils the opportunity to question and explore their knowledge about the origin of selected key scientific developments.
• Explain to your pupils that in this activity they will explore what they know about a number of key discoveries and developments in science.
• In small groups, ask your pupils to consider each of the inventions/developments given in Resource 1a and estimate when the discovery was made.
• You can either provide a period, for example dates ranging from the eighteenth to the twenty-first century, or leave this open for pupils to consider. A red herring can add to the debate.
• Encourage discussion within the groups so that pupils can reflect on how they arrived at their answers during debrief. Refer to Resource 1b for answers and to Fact Sheet 1 ‘All Mod Cons?’ for additional, explanatory information.
• Ask each group to feedback to the class. Record each group’s answers for each statement to collate a combined class response. Compare the pupil responses to the answers. Discuss the reasons they answered the way they did, drawing attention to any inconsistencies, misconceptions, or stereotypes.

Points for discussion and debrief
Ask your pupils:
• whether they were surprised about some of the dates and, if so, why?
• to give examples of any other inventions or developments ancient civilisations have given us;
• if it is important to understand that scientific inventions and knowledge are based on the inventions and knowledge of ancient civilisations and that we should give them credit for this;
• where our ideas about science come from; and
• how they think things are invented: by a gradual process of refinement? by accidental discovery? (for example penicillin); through trial and error; etc.

Tell your pupils:
• what CE (Common Era) and BCE (Before Common Era) mean as alternatives to AD and BC;
• that the majority world continues to contribute to science today: there are science institutions and centres of excellence throughout the world, not just in Europe and the USA, and scientists from all over the world work on ‘Big Science’ collaborations such as the Human Genome Project;
• that the benefits of science and technology are distributed unequally in favour of the minority world, despite the fact that these scientific and technological advancements are among the most important means of achieving fundamental collective goals of societies, including economic growth, health and well-being.

Extension Activity
• Ask your pupils, working in small groups, to choose one invention and list its uses and modern applications.
• Give them opportunities to discuss what the world would be like if this invention had never been created.
• Ask the groups to agree on three examples of how the world, either now or at any point in history, would have been different/changed if their chosen invention did not exist. Ask them how this difference would affect them in their day-to-day lives. Do other inventions depend on the invention of their chosen item? Would these other inventions, therefore, not have been created?
• Ask the groups to feedback to the class and collate their responses.
• Discuss the implications of their responses.
Guidance for Teachers

You could develop further activities to focus on a particular culture or civilisation. Consider, for example, the great Arabic and Muslim civilisations from the seventh century CE to the Middle Ages. The rise of Islam is one of the most important events in world history. In the seventh century Mohammed intended to unite the divided Arabs with a new religion. A century after his death, the Arab nations had become a medieval superpower. The Arabs and Moors had spread through Spain towards the Pyrenees. Cordoba became renowned as one of the greatest and wealthiest cities in Europe. Moorish cities, such as Toledo and Seville, were famed for their new culture and universities.

Science in the Muslim world refers to the science developed under Islamic civilisation, between the eighth and sixteenth centuries, during what we know as the Islamic Golden Age. It is also known as Arabic Science as most of the texts during this period were written in Arabic. Despite being called Arabic Science not all the scientists and thinkers were Muslim or Arab – many were from non-Arabic backgrounds.

Teaching about the contribution of Muslim thinkers and scientists provides a flexible and value-neutral platform to address some of the misconceptions, stereotypes, and anxieties – many of which are fuelled by a history of conflict and media representation – that pupils may have.

A detailed look at the Islamic Empire may help pupils to question these ideas. Activities could be framed with an introductory discussion about stereotyping in general, and specific stereotypes about Muslims (for illustrative purposes, see http://tinyurl.com/d6yffoj). Content could then focus on the contribution to and place of these civilisations in our collective scientific knowledge. In the Middle Ages, the best education and the leading scholars across the sciences and architecture lived in the Islamic Empire. The Islamic Empire brought sugar, the compass, numbers (including the decimal system), algebra, chess, and many other things to Europeans, through trade (for example along the Silk Road) and conquest.

Scientific achievement in the Muslim world is extensive. Like all cultures, the roots of its science drew on previous learning: Iranian, Indian and Greek. Activities could focus on some of the Muslim world’s contributions to:

- astronomy (for example observatories and Abu Ishaq ibn Jundub’s invention of the telescope);
- zoology and biology [Muslim biologists developed theories on evolution that were widely taught in medieval Islamic schools]; and
- medicine.

For more ideas, refer to:

- 1001 Inventions website at www.1001inventions.com/or
- The Association for Science Education website at http://tinyurl.com/cuhxn38
Background for Teachers

We live in a world increasingly dependent on various technologies, especially the mobile phone.

Twenty-five years or so ago a telephone was just a telephone. It was a way to contact someone if they happened to be at home when you called them. But a quarter century of mobile phones has changed not just our means and methods of communication, but also our behaviour.

Since Cellnet (now O2) and Vodafone first launched their mobile networks in 1985, the capability of mobile phone technology has progressed dramatically. In those early days, it was only possible to make a simple telephone call; you could not even leave a voicemail message. A handset cost about £2,000. It was expected that only about 250,000 people in the UK would ever own one. Customers regularly ended up speaking to complete strangers, as the analogue signals interfered with each other.

Today, over 50 million people in the UK own a mobile phone. That’s about 85 percent of the population. Digital signals have made crossed lines a thing of the past. In the UK we send about 25 billion text messages and talk on our mobiles for about 60 billion minutes per year. As the technical capabilities of networks and handsets evolve, we are using mobiles in ever more advanced ways: browsing the internet, sending texts/images, online gaming, and a huge number of apps.

Northern Ireland consumers are among the most enthusiastic for communication technology (mobiles, smartphones, etc.) in the UK. A recent OFCOM report stated that 92 percent of people in Northern Ireland use a mobile phone, with almost a quarter of these using smartphones. Northern Ireland leads the way across the UK for:

- sending text messages (93 percent);
- taking photos with a phone (71 percent);
- sending photo messages (64 percent); and
- playing games on phones (31 percent).

It’s not just adults, mobile phones have become central to children’s and young people’s lives. In Northern Ireland, research (conducted by NISRA) has found that 97 percent of 16–19 year olds and 62 percent of children aged 5–15 own a mobile phone. These percentages are among the highest in the whole of the UK.

The impact and influence of mobile phones continues to spread globally. Mobile web usage is highest in Asia and Africa, despite the widespread attention given to smartphone technology in the North American and European regions. For Asian and African consumers, web-enabled mobile phones have quickly become a necessity.

Suggested Learning Intentions

Pupils should have opportunities to:
- understand what conflict minerals are;
- explore the issues with conflict minerals; and
- examine the moral and social impact of conflict minerals on the global community.

Key Terms

- conflict minerals
- human cost
- individuals
- society
- global community
- conflict-free
dilemma

The term ‘conflict minerals’ refers to minerals that are extracted and sold to finance armed groups or criminal gangs. These minerals are mined in areas – like the eastern Democratic Republic of Congo (DRC) – where there is violence and human rights abuse.

Source: www.warchild.org.uk
In the face of poor infrastructure, poverty and limited access to traditional technologies, mobile phones are beginning to transform the lives of millions. Residents of these nations can benefit hugely from having access to mobile phones, whether they are performing routine banking, checking market prices, contacting health care practitioners, or using health care apps. However, the question of how mobile phones affect the people in majority world nations is a complex one. Mobile phones have brought some clear benefits, but not to everyone. For example, many of the minerals in our mobile phones – and our MP3 players, computers and game consoles – have an ugly story behind them. This has clear moral and social implications for consumers globally and locally.

By end of these activities, pupils should be aware:
- of what conflict minerals are, their role in electronics and their value;
- that attempts to control the sources of these minerals have led to conflict and that this, in turn, has negatively impacted on human rights and the environment; and
- that despite the negative impact of conflict minerals, many people in the source countries depend on the trade for their livelihoods.

Pupils should also have a greater understanding that actions and choices made locally can affect outcomes elsewhere in the world – and vice versa – because we are interconnected.

References
- http://tinyurl.com/3s5t794
- http://tinyurl.com/2w9teb2
- http://tinyurl.com/y9nmuc1

Opportunities for Thinking Skills and Personal Capabilities

Managing Information
Pupils should have opportunities to group, sort and evaluate information.

Thinking, Problem-Solving and Decision-Making
Pupils should have opportunities to:
- examine evidence; and
- analyse multiple perspectives.

Being Creative
Pupils should have opportunities to:
- develop curiosity; and
- explore.

Working with Others
Pupils should have opportunities to negotiate and influence.

Opportunities for Cross-Curricular Skills

Communication
Pupils should have opportunities to:
- listen to and take part in discussions, explanations, role-plays and presentations;
- contribute comments, ask questions and respond to others’ points of view; and
- communicate information, ideas, opinions, feelings and imaginings, using an expanding vocabulary;
- structure their talk and speak clearly so that ideas can be understood by others (Talking and Listening);
- communicate information, meaning, feelings, imaginings and ideas in a clear and organised way; and
- develop, express and present ideas in a variety of forms and formats, using traditional and digital resources, for different audiences and purposes (Writing).
Introductory Activity

Mobile Phones – Good or Bad?

This activity allows pupils the opportunity to explore the pros and cons of mobile phones. You can use it to gauge baseline knowledge and attitudes to mobile phones and, if used as a follow-on to Activity 1, as a means of examining subsequent learning or attitudinal change.

- Divide the class in half, then sub-divide into pro and con groups.
- Explain that the purpose of this activity is to explore the pros and cons of having and using mobile phones. Ask your pupils, within their groups, to discuss either pros or cons, as allocated.
- Encourage discussion within the groups so that pupils can reflect on how they arrived at their answers during feedback.
- Ask each group to feed back to the class (pro and con groups could take their turn alternately). Encourage your pupils to explain their views clearly and to participate in debate as appropriate.
- Finally, ask the pupils to choose a side based on whether they feel that there are more pros than cons associated with mobile phones. [Take a tally of those in each group, or use a ‘line’ with pro groups to one side and con groups to other].

We anticipate that responses in the introductory lesson will focus on personal and functional pros and cons of mobile phones. The pros may include:
- access to the internet;
- social networking; and
- games.

The cons may include:
- inappropriate use, for example when driving;
- anti-social;
- cost;
- nuisance, for example annoying ringtones; and
- poor signals.

Some answers may also refer to the health implications of mobile phones. Others may refer to bullying.

Some answers may also refer to the health implications of mobile phones. Others may refer to bullying.

Teachers may revisit this activity with pupils after completing the following activities. Hopefully, responses the pupils give on a second occasion will show greater consideration of the impact on individuals across the globe.

Other suggested resources:
- Pros and cons of mobile phones (BBC site):
  [http://tinyurl.com/cwpdabm](http://tinyurl.com/cwpdabm)
- Teen mobile phone pros and cons:
  [http://tinyurl.com/d8j9up](http://tinyurl.com/d8j9up)
- www.outofyourhands.com is a website set up by the Home Office to advise young people on how to protect themselves from mobile phone crime.
- www.stoptextbully.com is a website set up to support victims of mobile phone bullying.

Activity 1

Gold and the 3 Ts

As an optional warm-up to this activity, ask how many pupils have:
- a mobile phone; or
- a smartphone.

Ask how many pupils have:
- computers;
- MP3 players; or
- games consoles (for example PlayStation or Xbox).

Record the numbers and make this visible to the class throughout the following activities. [Refer to Fact Sheets 2 and 3.]

- Explain to your pupils that this activity will look at the materials that make up a mobile phone and other electronics, and where in the world they come from.
- With reference to Fact Sheet 2, explain that the materials that make up mobile phones (and other electronic goods) come from all over the world.
- Explain that there are four minerals of particular importance to electronic goods: gold and the 3 Ts. For further details, refer to Fact Sheet 3.
- Explain further that significant amounts of these minerals come from countries like the Democratic Republic of Congo (DRC) in central Africa. Tell your pupils that these countries have been experiencing war and conflict for many years as groups try to control these precious minerals.
Explain to pupils that these minerals are often called conflict minerals because they are in such high demand that government troops and criminal gangs frequently fight to control the mines. Use a map to illustrate the conflict (see Teacher Resource 1: Political Map of Africa).

Revisit Introductory Activity Mobile Phones – Good or Bad? Remind pupils that, at the end of the introductory activity, they chose either the pro or con group. Ask them to return to these groups. Then ask if any pupils want to change groups and allow them to move. If any pupils have moved, re-count the number of members in each group and record the changes. Give your pupils the opportunity to discuss and explore changes in their stance. Encourage pupils to reflect on what they have learned so far.

Questions for discussion and debrief
- Were they aware of the issues with conflict minerals before?
- Do they think their friends and family are aware of the connection?
- Do they have a responsibility to let others know about the situation?
- What can be done to end conflict minerals?
- Do ‘conflict free’ products exist?

Extension Activities
- Produce a poster or postcard to make other pupils at your school aware of the issue of conflict minerals. They could, for example, explain:
  - where conflict minerals come from;
  - what they are used for;
  - the conflicts in DRC; and
  - how people can help break the cycle (for example contact electronics companies, buy recycled goods or don’t buy at all).
- Could you live without your mobile phone? Prepare a presentation for other pupils in your school to explain whether you could live without your mobile phone. Explain any dilemmas you may have when buying electronic goods, like mobile phones, that may have been made with conflict minerals.

Refer to Fact Sheet 4 for some additional information.

Other Sources of Information
- Guardian online (supply of conflict minerals): http://tinyurl.com/cjhrjgf
- It makes you think – ideas for science with a global dimension: Mobile phones in Tanzania http://tinyurl.com/cybtk5t
- Are mobile phones Africa’s silver bullets? http://tinyurl.com/ctgq7t6
Background for Teachers

Why teach about water?
Seventy percent of our planet is covered in water and it’s essential to life, so you can be sure that water is a global issue. Water is a basic human need and it was recently declared a basic human right – but we don’t all have equal access to this essential resource.

Teaching about water with a Global Dimension offers a real opportunity to extend pupils’ experience from the local (school, home and community) to the global (introducing, investigating and understanding water issues in other parts of the world). Pupils will have the opportunity to understand the importance of water to human and environmental well-being, and the implications of inequality of access.

Suggested Learning Intentions
Pupils should have opportunities to:
- understand the concept of water conservation;
- be aware of the impact of unchecked water usage;
- recognise the efficient and non-efficient uses of water in our everyday activities;
- be aware of The Millennium Development Goals and that access to clean water is a human right.

Opportunities for Thinking Skills and Personal Capabilities

Managing Information
Pupils should have opportunities to:
- group, sort and evaluate information; and
- record and adapt information.

Thinking, Problem-Solving and Decision-Making
Pupils should have opportunities to make decisions/solve problems.

Working with Others
Pupils should have opportunities to learn with and from others.

Opportunities for Cross-Curricular Skills

Communication
Pupils should have opportunities to:
- listen to and take part in discussions, explanations, role-plays and presentations;
- contribute comments, ask questions and respond to others’ points of view;
- communicate information, ideas, opinions, feelings and imaginings, using an expanding vocabulary (Talking and Listening); and
- find, select and use information from a range of sources (Reading).

Using Mathematics
- Pupils should have an opportunity to read, interpret, organise and present information in mathematical formats.

Key Terms
- water conservation
- water usage
- scarce
- sustainable
- The Millennium Development Goals
- human rights
Existing Resources for ‘Water’

As water is an important element, there are a lot of learning and teaching resources already available. The following list is by no means exhaustive. It is meant as a starting point for teachers.

- **WaterAid UKLearnzone**
  Resources linked to the Key Stage 3 Geography and Citizenship (England) Curriculum at: www.wateraid.org/uk/learn_zone/teachers/default.asp

- **Centre for Alternative Technology Learning Resources**
  The Centre for Alternative Technology website has a range of free downloadable activities and resource lists for teachers, covering topics relating to global citizenship, biodiversity and sustainable development. Activities are mainly for Key Stage 2 and 3 at: http://learning.cat.org.uk/en/resources

- **Practical Action**
  The Practical Action website provides teaching resources with a global element for both primary and post-primary: www.practicalaction.org.uk/education

- **DFID Water – The works**
  This poster from DFID highlights key facts related to water issues across the globe in an interesting graphical format. It is free to download at: www.dfid.gov.uk/Documents/publications/waterworks.pdf

- **WaterAid Splash Out**
  Splash Out is a WaterAid website aimed at young people aged 7 to 14. There is a variety of background information on problems faced by children who don’t have safe water or toilets. Content includes an overview of the issues with downloadable fact sheets, information about the countries WaterAid works in, the children it works with and water-related facts and online games: www.wateraid.org/splash_out/

- **OXFAM, Water for all**
  This is a free online resource for 9 to 13 year olds. It includes a variety of activities based on the theme of water and water shortages. These can be used in a number of different subject areas: www.oxfam.org.uk/education/resources/water_for_all/water/gettingstarted.html

- **OXFAM, ‘Dealing with Disasters’**
  Activities based on why disasters happen and what we can do to help. These cover floods, earthquakes, hurricanes, and famine, and particularly detailed case study material about Bangladesh (for ages 11 to 14): www.oxfam.org.uk/education/resources/dealing_disasters/?48

- **National STEM Centre website: Drinking Water**
  This resource, from the Association for Science Education [ASE], explores drinking water safety in different parts of the world. It allows schools to exchange information about the sources of water for drinking and the implications for health: www.nationalstemcentre.org.uk/elibrary/resource/1723/drinking-water

- **BBC Interactive Site**
  A world map exploring water crisis points: http://tinyurl.com/2dw6p
Existing Resources for ‘Water’

- **Toilets: We all need to ‘go’**
  An exploration of toilets and sanitation issues, locally and globally at:
  www.globaldimension.org.uk/news/item/14820

- **UN Water**
  Resources for children and young people at:
  www.unwater.org/kids.html

**Other Sources of Information**

- **OXFAM Cool Planet for Kids**
  www.oxfam.org.uk/coolplanet/kidsweb/

- **Global Dimension site** [6 Sept, 2011] ‘Water’
  Gives a brief description of some of the global issues relating to water:

**Also visit any of the links below:**

- **UNICEF – Water and Sanitation:**
  http://tinyurl.com/cluq3lc

- **New Internationalist site has articles and features on water:**
  www.newint.org/themes/environment/water/

- **Practical Action site - Water and sanitation:**
  http://practicalaction.org/water-and-sanitation-answers

- **Water.org - Water facts:**

- **Water Footprint website:**
  www.waterfootprint.org/?page=files/home

- **Global Education (Australia) ‘Water the source of life’**
  www.globaleducation.edna.edu.au/globaled/go/pid/155
Fortunately for us, when we want water we simply turn on a tap. Water is piped into our homes, clean, fresh and available whenever we need it. But that doesn’t mean that we should waste it. Despite its apparent abundance – there is after all more water on the earth’s surface than there is land – water is a valuable commodity that we should not waste. Teaching young people to value, respect and, above all, not waste water is an important and ecologically sound lesson. The following learning activities allow pupils to explore these issues in further depth.

**Activity 1**

**Water Wars**

This activity increases pupil awareness of the impact of unchecked water usage. It also introduces the idea of water conservation, particularly in everyday situations, by comparing efficient and wasteful water use habits. Use Resources 2a and 2b in this activity.

**Materials needed**

- 4 large containers (capable of holding 6L of water – with graduations if possible. These can be added manually before the activity);
- 2 smaller measuring cups (with graduations for measuring up to 500ml);
- water (approximately 6L per large container. The task requires 5.5L, with the remainder allowing for spillage);
- Water Wars Chart (see Resource 2a); and
- Water Wars Cards (and receptacles to hold these) (see Resource 2b)

Please note, the amount of water required and the volume of containers and measuring cups can be altered to suit the equipment available. Ensure that the Water War Cards are adjusted accordingly.

- Group two of the large containers together and label them Water Wasters. Label the other two Water Savers.
- Label one container in each group as ‘water reserved’ and label the other ‘water used’.
- Fill each large container with the required amount of water. Cut out and place Water Wars Cards (Resource 2b) in a receptacle next to the relevant large containers.

1. Divide your pupils into two teams. Give each team a measuring cup. Tell your pupils that they will be taking part in a relay race called Water Wars to highlight the efficient and non-efficient uses of water in our everyday activities.

2. On each turn, one member from each team should select a Water Wars Card. The card will have a water-related statement and an amount (in millilitres) written next to it. Tell your pupils that they will be taking part in a relay race called Water Wars to highlight the efficient and non-efficient uses of water in our everyday activities.

3. Once finished, each group should compare the amount of water used with the amount left in their reserves. Encourage your pupils to read the graduations and record their measurements. If the containers are not graduated, allow them to take alternative measurements in, for example, the form of weight/volume.

4. Ask your pupils to record their findings in the Water Wars Chart (see Resource 2a). Then ask them to use their data to draw an appropriate graph or chart to present and compare Water Waster and Water Saver usage.

5. Ask your pupils to compare the various types of water use between the two groups by analysing the information provided on the Water Cards. To aid this process, display all the information on both sets of Water Cards or distribute it as a handout to each group.

6. Ask each group to discuss their findings, noting any differences and the types of water conservation tips and techniques that the game highlighted. Encourage your pupils to add tips and techniques of their own. If appropriate, allow your pupils time to explore other resources for additional ideas about water conservation.

**Questions for discussion and debrief**

- Why is it so important to save water?
- What steps can you take to save water?
- How easy would it be to make these changes in your daily life?
Activity 2
Water – A Human Right or Commodity?

Background for Teachers

Water is essential for human life – not only for the systems of the body, but also for the physical, social, economic, and political systems that sustain communities and countries. Water has no substitute or alternative. Water has a special place in the lives of humans. It is a basic human need and was recently declared a basic human right – but we don’t all have equal access to this essential resource.

Global Water Resources

About 70 percent of the earth’s surface is covered in water, but 97 percent of this is saltwater, which is unfit for human use. Of the remaining three percent, only about one percent is readily available for human consumption.

Additional Sources of Information

You can find additional water conservation tips and supporting facts and figures at:

- Learning and living with water: http://tinyurl.com/d2ojf4g
- Waterwise – Save Water: http://tinyurl.com/dyrhd7f
- A to Z of Water Saving Tips: http://tinyurl.com/43qyggy
- Watersmart Kids (Highland Council): http://tinyurl.com/c9m5er4
Consumable water is in increasingly short supply. In many parts of the world, including our own, water is taken for granted. Yet it is far more precious than most of us realise.

Freshwater is likely to become even more precious. According to the United Nations, one third of the world’s population lives in countries with inadequate water supplies. Areas that have recently experienced significant water shortages include China, Egypt, India, Israel, Pakistan, Mexico, parts of Africa and the United States.

More than half of the world’s largest rivers have been affected by damming, diversions or canals. In Africa, Lake Chad is shrinking and polluted. In many countries, human waste – used as fertiliser for agriculture – has drastically reduced the supply of drinking water.

The use of groundwater – supplies trapped in natural reservoirs and rivers underground – has helped to meet the shortfall, with roughly one third of the world’s population now depending on it. Although groundwater is in abundant supply, these reserves, which have built up over millennia, are not easy to replenish – especially in arid zones. Given present consumption patterns, this figure is likely to rise to two thirds by 2025. The rapid growth of the global economy – industrial and agricultural – and rising population levels are putting a strain on all resources. Households account for only 10 percent of total water usage, industry for 20 percent and agriculture for a huge 70 percent. By 2020, water use is expected to have risen by 40 percent of the 2001 level, with 17 percent more water needed for agriculture to meet the needs of the growing population. Approximately 40 percent of the world’s food production now depends on irrigation.

As water becomes scarcer, governments and the private sector will have to find solutions – technological, infrastructural, and educational – to the problem. These will most likely come at a cost. Across the globe there is an ongoing debate about whether water should be treated as a commodity. Currently, water itself is not so much a price commodity, but users pay for the service of delivering it. Economic theory tells us that scarcity, combined with consumer demand, increases a product’s value – as the price of oil demonstrates. Any increase in the cost of water is likely to be passed onto the consumer. Eventually, water may become a traded commodity, just like copper and oil. Already we can see signs of commercialisation of public water in different countries, including the growth of water banks and international transfer and sales of water resources, as well as huge sales of bottled water.

‘In today’s world water is something more than a source of life. Deprivation linked to water is a source of poverty, of inequality, of social injustice, and of great disparities in life chances. That deprivation matters because water is a human right – and none of us should turn a blind eye to the violation of human rights. Nor should we tolerate a world in which over one million children are, in a perversely literal sense, dying for a glass of water and a toilet.’

Kevin Watkins, Director, Human Development Report Office
Water: A Human Right

Some people believe that the current global water crisis is happening because there is not enough water for everyone. This is compounded by population growth. Although many countries are chronically water-stressed, the quantity of available (usable) water globally is quite enough for a world population of 6.6 billion. The United Nations has stated that the roots of the water crisis can be traced to poverty and inequality, not availability.

Some facts:
- At any one time, close to half of all people in majority world countries are suffering from health problems caused by poor water and sanitation.
- One in six people in the world lack safe drinking water.
- Water-related illnesses are the leading cause of human sickness and death.
- Each year, in developing countries, five billion cases of diarrhoea are diagnosed in children. This kills 1.8 million of them.

- Globally, diarrhoea caused by bacteria and viruses in polluted water kills more people than HIV/AIDS or malaria.
- In the absence of functioning drainage systems, water forms stagnant puddles that are soon infested with malaria-carrying mosquitoes. Malaria kills 3600 people each day – 3200 of them are children. Together, unclean water and poor sanitation are the world’s second biggest killer of children. It has been calculated that 443 million school days are lost each year to water-related illness.
- According to the UN ‘Universal access to even the most basic water and sanitation facilities would save health systems in developing countries about 1.6 billion US dollars each year.’

Clean water and sanitation are closely tied to human development. The second biggest killer of children worldwide is the combination of dirty water and lack of sanitation. This combination kills 4900 children each day. When children walk long distances to fetch water or when they get sick because they drink unclean water, they miss school and seriously harm their education. Poor education and health decrease their ability to work, and they sink into a vicious cycle of nearly inescapable poverty. Water costs nothing for those with everything and everything for those with nothing. The poorest pay huge sums for small amounts of water.

‘Access to safe water is a fundamental human need and, therefore, a basic human right. Contaminated water jeopardizes both the physical and social health of all people. It is an affront to human dignity.’

Kofi Annan, UN Secretary-General.
Activity 3
Time for Action

Ask your pupils to look at the Millennium Development Goals (MDGs) listed in Resource 3a. Clean water and adequate sanitation affect every single MDG – without these two things, none of the MDGs would be achievable.

- In the ‘Achieve the MDGs’ column, ask your pupils to list all the benefits of ensuring clean water and sanitation for everyone.

- What are the benefits for children, for families, and for us?

- In the ‘Do Nothing’ column, ask your pupils to list all the consequences of not ensuring this for everyone.

- Ask them what they think the consequences are for children, families and communities.

Remind your pupils to use the handouts and fact sheets provided, or any other sources of information you think are useful, to help them to complete this activity. (Refer to Fact Sheets 5, 6 and 7, if appropriate.)

Worldwide, women bear far more than their fair share of the costs of the water and sanitation crisis. In many places, culture dictates that women and girls take care of the household; so it is their responsibility to find and fetch water for their families. For girls, the lack of clean water and sanitation facilities close to home turns into lost opportunities to go to school, learn marketable skills, and fully participate in their communities.

In 2010, through Resolution 64/292, the United Nations General Assembly explicitly recognised the human right to water and sanitation. The resolution, adopted by consensus by the Human Rights Council, affirms that the right to water and sanitation are part of existing international law.

References
Resolution A/RES/64/292. United Nations General Assembly, July 2010 General Comment No. 15. The right to water. UN Committee on Economic, Social and Cultural Rights, November 2010.
Resource 1a

All Mod Cons?

- Flushing toilet
- Plastic surgery
- Eye surgery
- Central heating

- Automatic door
- Numbers
- Dentist’s drill
- Thermometer

- Vending machine
- Alarm clock
- Robots and robotics
- Computer

- Steam engine
- Seismometer
- Compass
- Concrete
Resource 1b
All Mod Cons? (Answers)

- 2600 BCE
- 600 BCE
- 600 BCE
- 100 BCE

- First century CE
- 3000 BCE
- 7000 BCE
- Third century BCE

- First century CE
- Third century BCE
- First century CE
- 100 BCE

- First century CE
- 132 CE
- Fourth century BCE
- 300 BCE?
Resource 2a
Water Wars Chart

How much water did each group use?
1. Record the volume of water used by each group. You can check the total amount in each container to work this out.

<table>
<thead>
<tr>
<th>How much water in the containers?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Wasters</td>
</tr>
<tr>
<td>Water used</td>
</tr>
<tr>
<td>____ml</td>
</tr>
</tbody>
</table>

2. a. In the table below, write down the amounts specified on each Water Wars Card next to the corresponding water use in the table below. You will have to combine some items. For example, where ‘taking a shower’ is listed, you will have to check the all the Water War Cards and tally the amount that refer to taking a shower. b. Calculate and record the totals for water wasters and water users.

<table>
<thead>
<tr>
<th>Water Use</th>
<th>Amount of Water (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water Wasters</td>
</tr>
<tr>
<td>Making a cup of tea</td>
<td></td>
</tr>
<tr>
<td>Using washing machine</td>
<td></td>
</tr>
<tr>
<td>Dripping taps</td>
<td></td>
</tr>
<tr>
<td>Taking a shower</td>
<td></td>
</tr>
<tr>
<td>Taking a bath</td>
<td></td>
</tr>
<tr>
<td>Flushing the toilet</td>
<td></td>
</tr>
<tr>
<td>Brushing teeth</td>
<td></td>
</tr>
<tr>
<td>Washing hands/face</td>
<td></td>
</tr>
<tr>
<td>Washing dishes by hand</td>
<td></td>
</tr>
<tr>
<td>Using a dishwasher</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

3. Use the information recorded in the table above to create a chart or graph comparing the efficiency of each group’s water use.
## Resource 2b
### Water Wars Cards

Cut out these cards and place them next to the relevant water containers ('Water Waster' or 'Water Saver').

<table>
<thead>
<tr>
<th>Water Wasters</th>
<th>Water Savers</th>
</tr>
</thead>
<tbody>
<tr>
<td>You take long hot showers and you let the water run while you get undressed.</td>
<td>You take quick showers.</td>
</tr>
<tr>
<td><strong>Take 500ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
<td><strong>Take 125ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
</tr>
<tr>
<td>You let the water run when you brush your teeth.</td>
<td>You don’t run the water when brushing your teeth (and use a glass of water to rinse and clean the brush).</td>
</tr>
<tr>
<td><strong>Take 250ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
<td><strong>Take 125ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
</tr>
<tr>
<td>You flush every single time you use the bathroom.</td>
<td>You flush only when necessary.</td>
</tr>
<tr>
<td><strong>Take 250ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
<td><strong>Take 125ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
</tr>
<tr>
<td>You let the shower run while you shampoo your hair or use shower gels.</td>
<td>You turn off the shower when you are using soap or shampoo.</td>
</tr>
<tr>
<td><strong>Take 500ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
<td><strong>Take 100ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
</tr>
<tr>
<td>You flush things you don’t need to – tissues, creepy crawlies, and other things.</td>
<td>You never flush things you don’t need to – like tissues and creepy crawlies.</td>
</tr>
<tr>
<td><strong>Take 250ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
<td><strong>Take 125ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
</tr>
<tr>
<td>You let the water run when you wash your face and hands.</td>
<td>You fill the sink to just the right amount when you wash your face and hands.</td>
</tr>
<tr>
<td><strong>Take 250ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
<td><strong>Take 125ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
</tr>
<tr>
<td>You love to have hot baths filled right up.</td>
<td>You take short showers. If you really need a bath, you only have a shallow one.</td>
</tr>
<tr>
<td><strong>Take 500ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
<td><strong>Take 125ml from the ‘water reserve’ and pour it into ‘water used’</strong>.</td>
</tr>
<tr>
<td>Water Wasters</td>
<td>Water Savers</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>You like your water cold, so you run the tap for a very long time. Sometimes you even let it run while you’re drinking.</td>
<td>You like cold water to drink. But, instead of running the tap, you chill water in the fridge to drink when you need it.</td>
</tr>
<tr>
<td>Take 250ml from the ‘water reserve’ and pour it into ‘water used’.</td>
<td>Take 125ml from the ‘water reserve’ and pour it into ‘water used’.</td>
</tr>
<tr>
<td>You load small amounts in your washing machine and never use economy cycles</td>
<td>You use economy cycles and wash full loads.</td>
</tr>
<tr>
<td>Take 500ml from the ‘water reserve’ and pour it into ‘water used’.</td>
<td>Take 250ml from the ‘water reserve’ and pour it into ‘water used’.</td>
</tr>
<tr>
<td>You use the dishwasher even when it’s not full.</td>
<td>You mostly wash dishes by hand. When you use the dishwasher, it’s full/for large loads.</td>
</tr>
<tr>
<td>Take 500ml from the ‘water reserve’ and pour it into ‘water used’.</td>
<td>Take 250ml from the ‘water reserve’ and pour it into ‘water used’.</td>
</tr>
<tr>
<td>You wash your dishes under running water.</td>
<td>You never wash your dishes in running water. You always fill the sink.</td>
</tr>
<tr>
<td>Take 500ml from the ‘water reserve’ and pour it into ‘water used’.</td>
<td>Take 250ml from the ‘water reserve’ and pour it into ‘water used’.</td>
</tr>
<tr>
<td>You let taps drip and don’t fix faulty pipes and taps.</td>
<td>You fix faulty pipes and taps and turn off dripping taps.</td>
</tr>
<tr>
<td>Take 500ml from the ‘water reserve’ and pour it into ‘water used’.</td>
<td>Take 0ml from the ‘water reserve’ and pour it into ‘water used’.</td>
</tr>
<tr>
<td>You haven’t insulated your pipes, so it takes a while for the water to heat up.</td>
<td>Your water pipes are insulated, so the water runs hot quickly.</td>
</tr>
<tr>
<td>Take 500ml from the ‘water reserve’ and pour it into ‘water used’.</td>
<td>Take 100ml from the ‘water reserve’ and pour it into ‘water used’.</td>
</tr>
<tr>
<td>You fill the kettle up when you’re making tea.</td>
<td>You only fill the kettle with the amount of water that you need.</td>
</tr>
<tr>
<td>Take 250ml from the ‘water reserve’ and pour it into ‘water used’.</td>
<td>Take 100ml from the ‘water reserve’ and pour it into ‘water used’.</td>
</tr>
</tbody>
</table>
## Resource 3a
### The Millennium Development Goals

<table>
<thead>
<tr>
<th>The Millennium Development Goals (MDGs)</th>
<th>achieve the MDGs?</th>
<th>do nothing?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. End poverty and hunger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Make sure all children go to primary school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Promote gender equality... make sure males and females are treated equally</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Reduce the number of children dying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Improve the health of mothers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Fight diseases like HIV/AIDS, malaria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Ensure environmental sustainability... take better care of our environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Develop a global partnership... countries working together to achieve the MDGs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As with many inventions, the toilet is a result of developments that came before it. For example, more than 5000 years ago, a neolithic village on Orkney called Skara Brae used a river and connecting drainage system to wash waste away. Flush toilets (as we would recognise them) were first used about 4500 years ago (circa 2600 BCE) by the Indus Valley Civilisation. These were groups of people spread over an area containing modern day Pakistan, northwest India, and eastern Afghanistan.

The cities of Harappa and Mohenjo-daro had a flush toilet in almost every house, attached to a sophisticated sewage system. The people of the Indus Valley also created plumbing pipes that were made from earthenware (clay) for their homes almost 5000 years ago (circa 2700 BCE). They prevented these pipes from leaking by using asphalt (a sticky black oily substance – still used in road making today).

In 1596 Sir John Harrington, godson of Queen Elizabeth I, invented and built a flush toilet similar to what we use today. The Queen refused to use it because it made too much noise. The first patent for the flushing toilet was issued to Alexander Cummings in 1775, and is still used today.
Plastic surgery: India, circa 600 BCE

Plastic surgery is one of the oldest forms of surgery practised. Operations were probably performed in India as early as 2000 BCE, reconstructing the noses and ears of people who had been disfigured through punishment or warfare. They rebuilt the nose by using a portion of the forehead, a technique still employed today.

Sushruta, an Indian surgeon who taught and practised surgery on the banks of the River Ganges, was one of the earliest surgeons in recorded history (600 BCE). Despite practising medicine and surgery nearly 3000 years ago, many of his contributions – including plastic surgery – preceded similar discoveries in the Minority world. He wrote a surgical book called the Sushruta Samhita, which some people believe is the oldest known book about surgery. Due to his great surgical skills and innovation, Sushruta is also known as the 'Father of Surgery' and the 'Father of Plastic Surgery'.

Cataract surgery: India, circa 600 BCE (perhaps earlier)

A cataract is a clouding of the lens in the eye. People with cataracts have blurred vision (and may even go blind), making everyday activities difficult. Successful cataract surgery restores clear sight. Cataract surgery has a long history. It was mentioned in the code of Hammurabi, a Babylonian king who lived 4000 years ago, and in the Ebers Papryus (from Egypt, dating from 1500 BCE). Perhaps the first known written text dedicated to this type of surgery dates back almost 3000 years. Sushruta was not only the father of surgery - for many he was the father of ophthalmology (the branch of medicine concerned with the study and treatment of disorders and diseases of the eye). Sushruta wrote a medical book dedicated to eye diseases and surgery, including the removal of cataracts. He performed cataract surgery with a special tool called the Jabamukhi Salaka. This is a curved needle used to loosen the lens and push the cataract out of the field of vision. The eye would later be soaked with warm butter and then bandaged. Though this method was successful, Sushruta cautioned that cataract surgery should only be performed when absolutely necessary.
Central Heating: Roman Territories, circa 100 BCE

Rich Romans liked to be warm and cosy. They had central heating at home, in villas and in public baths. These central heating systems were called hypocausts. As well as heating the homes of Romans (who could afford it), hypocausts were used in the large public baths. Sauna rooms were heated by the hypocaust. They were a place where Romans could bathe in the hot water and socialise with friends. The heating system was maintained by slaves, who kept a fire blazing in a furnace to heat the air. The warm air moved around the building through spaces under the floors and between the walls. The space under the floor was made by raising the floor on top of piles of tile or stone. The Roman architect, Vitruvius, writing about the end of the first century BCE, claims that they were invented by a Roman engineer, Sergius Orata, but this cannot be confirmed.

Automatic Doors: Greece, circa 100 CE

When you walk into most supermarkets, you may think that the doors opening for you must be a recent, modern invention. However, 2000 years ago in the first century CE, Hero (sometimes called Heron) of Alexandria created automatic doors in Alexandria using steam power.

Hero describes not one, but two different automatic door applications. One used heat from a fire. After a few hours, atmospheric pressure built up in a brass vessel causing it to pump water into nearby holding containers that were attached to ropes. These containers acted as weights that would open the temple doors when people were arriving for prayer. Heron used a similar application to open the gates to the city.

Hero of Alexandria was an Ancient Greek mathematician, engineer and inventor. He lived sometime around 10 to 70 CE. He developed many mechanical machines that had practical uses. For example, automatic doors, a vending machine, a water organ, a fire engine and the Hero Engine (also called the aeolipile), which was a rocket-style jet engine. He is credited with the invention of the syringe and a primitive, programmable robot as a device to entertain audiences at the theatre.
According to Albert Einstein, India ‘taught us how to count’. Indians invented the numbers 1 to 9 and ‘zero’, without which there would be no computers or digital age. Some historians think that older civilisations actually invented numbers and place value (what we call decimal points), so there is much debate. For example, it is known that the Egyptians counted in base 10 (decimal, like we do) as far back as 3100 BCE.

People have been counting for a very long time. Our earliest ancestors would have marked cave walls, bones, etc. to keep a tally of days or quantities (like food and animals). But before the Indians started using zeroes and place value, our ancestors were keeping tallies.

The general view is that our numbers (0 to 9) were invented in India. We call them Arabic numbers because Persian mathematicians in India started using them and refined them. They passed these on through their books and trade to Arab lands to the west of India, then the Arab civilisations passed these (through books, trade and colonialism) to Europe. As the numbers travelled, they were gradually changed to resemble the numbers we recognise today.

Archaeologists made the discovery that the Indus Valley Civilisation had knowledge of medicine and dentistry. Researchers have found evidence of teeth having been drilled dating back to 7000 BCE (9000 years ago). This earliest form of dentistry involved curing tooth-related disorders with bow drills operated, perhaps, by skilled bead craftsmen. The reconstruction of this ancient form of dentistry showed that the methods used were reliable and effective. Cavities of 3.5 mm depth with concentric grooves indicate use of a drill tool.
Many historians credit European scientists in the Middle Ages with inventing the thermometer: Cornelis Drebbel (Dutch builder, 1572–1633); Robert Fludd (English physicist, 1574–1637); Galileo Galilei (Italian physicist, astronomer and philosopher, 1564–1642); Santorio Santorio (Italian physicist, 1561–1636). However, like many of our technologies, the thermometer was not a single invention. It was a gradual development.

The thermometer is perhaps an invention that dates back to the Greeks of Alexandria more than 2000 years ago: Philo of Byzantium and Hero of Alexandria. They discovered that air expanded when heated, and made something that could be described as a basic thermometer that used this concept. For example, Hero of Alexandria demonstrated how the heating and cooling of air moved water up or down a glass tube. To be considered a thermometer in the proper sense, the device would need to have a scale on it (so it could measure degrees of change in temperature). The first thermometer as we know it, with a scale, was created in 1638 by Robert Fludd, an English physicist.

Every time you put money into a machine for a chocolate bar, you can thank the Ancient Greeks. It’s our old friend Hero of Alexandria again. The first vending machine – for holy water – was also one of his constructions. When a coin was introduced, via a slot on the top of the machine, it fell onto a pan, and a set amount of holy water was dispensed. The pan would tilt until the coin fell off, thereby turning off the water.

You can blame the Greeks for waking you up in the morning to go to school. The alarm clock was created in the third century BCE by Ctesibius, a Greek inventor and mathematician who lived in Alexandria, Egypt. The original Greek alarm clock used a dial and pointer for the time and had an alarm system that would drop pebbles into a gong at a pre-set time. He also created a water clock that kept more accurate time than any clock invented until the seventeenth century.
During the time of Alexander the Great, inventors designed marvels that were hundreds of years ahead of their time – robots. The first evidence of such creations was found in ancient Greece. It was a lion figure with a mixture of gears and cranks inside. When scientists recreated it, it was considered a masterpiece. The lion walked across the room, stood up, and then its chest would open to reveal flowers. Many believe that Archimedes created this robotic lion, but no-one can agree for certain.

Hero of Alexandria also invented robots. His engineering work often used automated devices that could be programmed to do specific tasks, and then left to themselves to complete the work. He has been credited as one of the great-grandfathers of cybernetics, a science that did not emerge until the mid-nineteenth century. It has been suggested that Hero also built the first programmable robot. In about 60 CE he constructed a three-wheeled cart that could carry a group of automata to the front of a stage where they would perform for an audience. Power came from a falling weight that pulled on a string wrapped round the cart’s drive axle. According to Noel Sharkey, a computer scientist at the University of Sheffield, this string-based control mechanism is exactly equivalent to a modern programming language (a set of rules for giving instructions to a computer).

The oldest known scientific computer was a device built in Greece around 100 BCE. This mechanism had been lost and unknown for 2000 years. It was recovered in 1901 from a shipwreck near the island of Antikythera (which gave the device its name the Antikythera mechanism). It took one century for scientists to understand its purpose: it is an astronomical clock designed to calculate the positions of the sun, moon, and other celestial bodies. It contained many gears and some call it the first known ‘analogue computer’. Devices of similar detail and workmanship did not reappear until the fourteenth century, when mechanical astronomical clocks were built in Europe.
### Steam Engine: Greece/Alexandria, circa First century CE

The Greeks also pioneered steam power 2000 years before the steam engine. The first recorded, primitive steam engine was called the aeolipile. It was probably invented by [yes, you guessed it] Hero of Alexandria. At the very least, he was the first to write a description of the device. In the following centuries, the few steam-powered 'engines' known about were essentially experimental devices used by inventors to demonstrate the properties of steam. The first practical steam-powered ‘engine’ was a water pump, developed in 1698 by Thomas Savery.

### Seismograph: China, circa 132 CE

Seismometers and seismographs are instruments that measure motions of the ground, including those of seismic waves generated by earthquakes and volcanic eruptions.

Although the Chinese couldn’t tell anyone exactly what an earthquake measured, they did manage to invent the world’s first earthquake detector. Zhang Heng – a Chinese astronomer, mathematician, inventor, and map maker – invented the first seismoscope (in 132 CE). A seismoscope is different to seismometers and seismographs because it doesn’t accurately measure motions, but indicates that motion has occurred. Chinese historical texts describe a large bronze vessel, about two metres in diameter, with nine dragon’s heads holding bronze balls around the top of it. Inside the vessel, a pendulum hung motionless. When there was an earthquake the pendulum would move, knocking one of the mouths open. This would cause the ball to drop, making a sound and supposedly showing the direction of the earthquake. On at least one occasion, probably at the time of a large earthquake in Gansu in CE 143, the seismoscope indicated an earthquake even though one was not felt. Days later, a rider from the east reported this earthquake. This first seismograph seems a bit basic, but it would be another 1500 years before minority nations developed their own versions.
Concrete: Rome, circa 300 BCE

Concrete is basically a mix of lime, clay, sand and gravel. In this basic sense, humans have been using concrete-like materials for thousands of years. The earliest use we know about was a hard floor for a house in eastern Europe (modern Serbia) about 5600 BCE. The Assyrians and Babylonians used clay to bind sand and stones, and the ancient Egyptians discovered lime and gypsum. The Egyptians were using early forms of cement over 5000 years ago to build pyramids. They mixed mud and straw to form bricks and used gypsum and lime to make mortars.

The Egyptians, Mesopotamians, Chinese and Greeks knew how to make concrete but they didn’t use it very much. The Romans used it extensively. The name concrete comes from the Latin ‘concretus’, which means to grow together. The ancient Romans used a material that is remarkably close to modern cement – what today we call hydraulic cement - based concrete: concrete that can harden even underwater or when constantly exposed to wet weather. Concrete freed the Romans from the restrictions of stone and brick, and allowed them to create larger and more decorative buildings such as the Colosseum and the Pantheon. The Pantheon in Rome is one of the finest examples of Roman architecture that survives to this day. It has a 42 metre diameter dome made of poured concrete.

You can make reinforced concrete by putting metal rods inside the concrete. This makes it a lot stronger. Most concrete buildings today are reinforced with steel. The Romans were the first to use reinforced concrete, mainly in aqueducts. After the fall of Rome, neither the Islamic Empire nor the European kingdoms used as much concrete as the Romans had. They preferred to build in stone.
The Compass: China, circa Fourth century BCE

Where would we be without the compass? We’d be lost, that’s where. Compasses are not only used by campers and hikers, but also in aviation and navigation. The compass was also a key tool in exploration and colonialism that in turn led to many technological developments.

The earliest compasses were created in the fourth century BC and were made of lodestone. Lodestones are magnets found in nature. They are chunks of magnetite (Fe3O4) that have been exposed to the strong magnetic field from a bolt of lightning that has struck the earth. As early as 800BCE, both the Chinese and the Greeks knew that pieces of iron would stick to lodestone.

One of the earliest known recorded uses of a compass is from China. There are records in ancient texts dating from approximately 100CE of a ‘South Pointer’. (Originally, the Chinese created their compasses to point to true south, not true north). The device was a lodestone spoon that was balanced on a plate. The cup part of the spoon would point south, giving the Emperor the direction he needed. There is also evidence of compasses being used in the laying out of some very old cities in the south of China, for example in the city of Kansu.
# References and Further Information

<table>
<thead>
<tr>
<th>toilets and plumbing</th>
<th>Plastic Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://tinyurl.com/ccx9yqh">http://tinyurl.com/ccx9yqh</a></td>
<td></td>
</tr>
<tr>
<td><a href="http://tinyurl.com/c94elkd">http://tinyurl.com/c94elkd</a></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cataract Surgery</th>
<th>Central Heating</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://tinyurl.com/ct8ff95">http://tinyurl.com/ct8ff95</a></td>
<td></td>
</tr>
<tr>
<td><a href="http://tinyurl.com/cfex7kp">http://tinyurl.com/cfex7kp</a></td>
<td></td>
</tr>
<tr>
<td><a href="http://tinyurl.com/cy55s64">http://tinyurl.com/cy55s64</a></td>
<td></td>
</tr>
<tr>
<td><a href="http://tinyurl.com/cbyejaq">http://tinyurl.com/cbyejaq</a></td>
<td></td>
</tr>
<tr>
<td><a href="http://tinyurl.com/cznlgfk">http://tinyurl.com/cznlgfk</a></td>
<td></td>
</tr>
<tr>
<td><a href="http://tinyurl.com/aqhcx">http://tinyurl.com/aqhcx</a></td>
<td></td>
</tr>
<tr>
<td><a href="http://tinyurl.com/cf5gcu3">http://tinyurl.com/cf5gcu3</a></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Automatic Doors</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://tinyurl.com/cgytzls">http://tinyurl.com/cgytzls</a></td>
<td></td>
</tr>
<tr>
<td><a href="http://tinyurl.com/ctfu6hg">http://tinyurl.com/ctfu6hg</a></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dentistry</th>
<th>Thermometers</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://tinyurl.com/pffvm">http://tinyurl.com/pffvm</a></td>
<td></td>
</tr>
<tr>
<td>Dictionary of the History of Ideas</td>
<td></td>
</tr>
<tr>
<td><a href="http://tinyurl.com/br4xay8">http://tinyurl.com/br4xay8</a></td>
<td></td>
</tr>
<tr>
<td>Vending Machines</td>
<td>Robotics</td>
</tr>
<tr>
<td>------------------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td><a href="http://tinyurl.com/6xf8jez">http://tinyurl.com/6xf8jez</a></td>
</tr>
<tr>
<td></td>
<td>History of robotics <a href="http://tinyurl.com/cn4fkd6">http://tinyurl.com/cn4fkd6</a></td>
</tr>
<tr>
<td></td>
<td>A Short History of Robots <a href="http://tinyurl.com/76coh">http://tinyurl.com/76coh</a></td>
</tr>
<tr>
<td></td>
<td><a href="http://tinyurl.com/c9homva">http://tinyurl.com/c9homva</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Computer</th>
<th>Steam Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://tinyurl.com/2h7soq">http://tinyurl.com/2h7soq</a></td>
<td><a href="http://tinyurl.com/cnpl2aw">http://tinyurl.com/cnpl2aw</a></td>
</tr>
<tr>
<td><a href="http://tinyurl.com/cnpl2aw">http://tinyurl.com/cnpl2aw</a></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seismometer</th>
<th>Concrete</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Compass</th>
<th></th>
</tr>
</thead>
</table>
What Makes up your Mobile Phone?
Fact Sheet 2

Mobile Phones are complicated gadgets very much like a computer. Mobile phones mostly comprise three components – handset, battery, and charger.

The Handset
The handset includes:

- **Circuit Board (PCB)** – this is the electronics. The circuitry is made mostly of copper soldered to a fibreglass board. The board is usually gold plated. Other substances used in the PCB include arsenic, antimony, beryllium, cadmium, lead, nickel, palladium, silver, tantalum (also known as coltan) and zinc;
- **Liquid Crystal Display (LCD)** – two layers of glass, like a sandwich, filled with liquid crystals. Sometimes these crystals contain chemicals such as mercury;
- **keypad**;
- **antennae**;
- **microphone**; and
- **casing**.

These parts of the phone are made from a mixture of plastics and metals.

The Battery
The battery can contain chemicals such as cadmium, nickel, zinc, copper and coltan.

The Charger
This is mainly copper wires encased in plastic, but gold, cadmium and materials that are flame retardant may also be present.

Mobile Phone Composition
Where do the ‘ingredients’ in our mobile phones come from?

The materials that make up mobile phones come from all over the world. The chart on page overleaf displays some (but not all) of the major areas where these materials are extracted.

Although not listed on the map, significant amounts of these minerals come from countries like the Democratic Republic of Congo (DRC) in central Africa. For example, the DRC possesses 80 percent of the world’s coltan (tantalum), but only mines a fraction of it. Tin, tungsten, and gold are also mined in the DRC.

It turns out that many of the minerals in our mobile phones – and our MP3 players, computers and games consoles – have an ugly story behind them, similar to that of ‘blood diamonds’. See Fact Sheet 3 [Conflict Minerals and our Electronic Goods] for more about where these materials come from and the true cost of extracting them.

Sources:

- GRID-Arendal site, set up by the Norwegian Government, a collaborating centre of the United Nations Environment Programme (UNEP) site: www.grida.no/graphicslib/detail/cell-phone-composition_1057#
- What natural resources are extracted to make a cell phone?: www.secret-life.org/cell_environment.php#E4
- CBBC News online: What are conflict diamonds?: http://news.bbc.co.uk/cbbcnews/hi/newsid_6290000/newsid_6291300/6291375.stml
Mobile Phone Composition

Mostly contained in...
- Circuit boards
- Case
- Wires
- Screen
- Chips
- Batteries

* 3% ‘other’ includes, amongst other things, less than 0.1% antimony, gold and beryllium.


© INFORM, Inc
Conflict Minerals and our Electronic Goods
Fact Sheet 3

Do you own any of these items?
- Games console;
- mobile phone or smartphone;
- computer (Mac or PC);
- MP3 player;
- tablet computer;
- digital camera?

You probably do. Many of us do.

If you own one of these devices the chances are you have, without even knowing it, helped to fund wars, slave labour, and other human rights abuses.

How is that possible?
As our devices get smaller and faster, they need specialised minerals to work effectively.

Look at Fact Sheet 2 (What Makes up your Mobile Phone?) for a reminder of the sorts of minerals that go into a mobile phone.

A significant amount of these minerals come from countries like the Democratic Republic of Congo (DRC). Because these resources are in such high demand, government troops and criminal gangs frequently fight to control the mines. Most electronics companies – including those that produce the best known brands – have bought minerals from mines throughout the DRC.

So what do we mean by conflict minerals?

The term conflict minerals refers to minerals that are extracted and sold to finance armed groups or criminal gangs. These minerals are mined in areas – like the eastern DRC – where there is violence and human rights abuses. Source: Warchild website

The Conflict Minerals: Gold and the 3 Ts

In the eastern DRC, the main conflict minerals are gold and the 3 Ts: tin, tungsten and tantalum.

- **Gold** is the biggest source of conflict mineral trade in the DRC and is the cause of most of the ongoing bloody conflicts.
- **Tin (cassiterite)** - cassiterite is a tin oxide that is mined extensively in the DRC. The refined tin is found in most household electronic items as it’s used as the solder for circuit boards.
- **Tungsten (wolframite)** - tungsten is a dense metal used in everything from light bulbs to televisions, Formula One cars to bullets. It’s also used in mobile phones.
- **Tantalum (coltan)** - coltan is the African slang name for a rare blue/grey metal called tantalum. Tantalum is expensive because it’s so useful. It does not corrode (go rusty), so surgeons use tantalum bolts to fasten broken bones. Tantalum can store an electrical charge and then release it slowly. So tantalum components are vital in mobiles, laptops and game consoles. The DRC has 80 percent of the world’s coltan, but only mines a fraction of it.

Conflict Minerals in the DRC

With its abundance of mineral resources, the DRC could be one of the most prosperous countries in Africa. The DRC is rich in minerals such as gold, diamonds and coltan, but, after years of conflict and misrule, most people live in poverty.

The conflict in the DRC has claimed more than 5.4 million lives since it began in the late 1990s. The Congolese army, rather than protecting the Congolese people, is not much different to the other armed groups fighting for control of the mines.

The conflict in the DRC has claimed more than 5.4 million lives since it began in the late 1990s. The Congolese army, rather than protecting the Congolese people, is not much different to the other armed groups fighting for control of the mines.

Over 50 percent of the mines in the eastern DRC are controlled by armed groups who earn hundreds of millions of dollars every year by trading in these minerals. The gangs use profits from the mines to buy more weapons and to fund their war.
How are the people of the DRC affected?
According to the UN, most coltan mining in the DRC is done by local untrained miners, because the war has forced the mining companies out of business. The rebel groups are also believed to mine coltan directly, using labourers (sometimes prisoners), then smuggle it out of the country. These gangs also use violence to control the communities that work in the mines. They use murder, rape, kidnapping and other human rights abuses against these civilians in order to keep control of them.

- More than one million people in the DRC have been forced to flee their homes.
- Many parents are unable to work because of fighting and can’t afford to send their children to school.
- Hospitals have become inaccessible and run-down.
- Approximately 2.7 million children have died since 1998 as a result of the conflict in the DRC. Some are killed by the bombs, bullets and knives, but the majority die from preventable or treatable diseases because they can’t access basic healthcare services. One in five children will die before they are five years old.
- Many mines use child and/or forced labour – some estimates suggest that 30 percent of schoolchildren in the northeastern DRC no longer go to school and are forced to work in coltan mines.
- There are also concerns about worker safety – many mines are nothing more than holes in the ground. The mines frequently collapse, causing death and severe injury. Mining is linked with damage to the environment.
- The DRC remains the most dangerous place in the world to be if you are a woman or a girl: more than 200,000 women and girls have been the victim of sexual violence.

But there is another side to the story...
These mines support armed groups, but they also contribute to the livelihood of a large number of Congolese people as well as people from neighbouring countries.

Some minerals are mined legally, providing jobs and income through local and national economies. As many as one million people in the eastern DRC are economically dependent on the minerals trade, while the World Bank estimates 10 million Congolese (16 percent of the population) are in some way dependent on the mining industry in the country.

What can we do about it?
Governments, companies who make electronics, and consumers (the people who buy the goods) are now beginning to ask whether using conflict minerals is the right thing to.

No company as yet produces ‘conflict-free’ electronic goods, but some are asking their suppliers to certify that the minerals they sell are not from conflict zones. Some people think that the only way to be sure that you’re not using conflict minerals is not to use any materials from places like the DRC. Other people say that this would have a negative effect on the local people who rely on the mines for their livelihood.

Companies that use conflict minerals are not breaking the law. The people who buy the electronic goods have the power to demand conflict-free products from the companies that make them.

What can you do?
Visit www.raiselhopesforcongo.org and commit to buying conflict-free electronics when the companies make them.

Check out which of the electronics manufacturers are making the most effort to use conflict-free minerals (and avoid those who are not). You can check out who is making the effort and who needs to try harder at www.raiselhopesforcongo.org/content/conflict-minerals-company-rankings

Other Sources of Information
- Congo’s conflict minerals: www.warchild.org.uk/issues/congo-conflict-minerals?
- BBC website: Q&A on DRC Conflict: www.bbc.co.uk/news/world-africa
- Conflict in the Congo: www.warchild.org.uk/issues/conflict-in-democratic-republic-of-congo
Could you Live Without your Mobile Phone?
Fact Sheet 4

We live in a world dependent on various technologies – music players, phones, computers and the online environment.

According to a recent OFCOM report, Northern Ireland is increasingly embracing the online world with more people than ever before using social networking, watching catch-up TV, and making calls over the internet.

• More people also have an MP3 player than anywhere else in the UK.
• More than half of homes (52 percent) have a games console, the highest proportion in the UK.
• 70 percent of households have broadband, almost matching the UK average of 71 percent and well ahead of Scotland and Wales.

And what about mobile phones – just how did we ever live without them?

Consumers in Northern Ireland are among the most enthusiastic for communication technology (mobiles, smartphones, etc.) in the UK.

• 92 percent of people in Northern Ireland use a mobile phone. Of those people, almost a quarter have a smartphone (23 percent).
• Northern Ireland leads the way across the UK for sending text messages (93 percent), taking photos with a mobile (71 percent), sending photo messages (64 percent) and playing games on their phone (31 percent).

It’s not just adults. Mobile phones have become central to children and young people’s lives.

According to a recent survey carried out by Childwise, six out of ten children aged 7 to 16 have a mobile phone that can access the internet (61 percent), rising to three in four among 11 to 16 year olds (77 percent).

In Northern Ireland, research has found that 97 percent of 16 to 19 year olds own a mobile phone and that 62 percent of children aged 5 to 15 own a mobile phone. This was one of the highest statistics in the whole of the UK.

According to OFCOM:

• 47 percent of teenagers across the UK own a smartphone.
• Many are ditching more traditional activities in favour of their smartphone, with 23 percent claiming to watch less TV and 15 percent admitting they read fewer books.
• When asked about the use of these devices, 60 percent of teens admit they are ‘highly addicted’.
• The rapid growth in the use of smartphones – which offer internet access, email and a variety of internet-based applications – is changing the way many of us, particularly teenagers, act in social situations. For example, 65 percent of teenagers say they have used their smartphone while socialising with others; 34 percent while eating; 47 percent of teenage smartphone users admitted using or answering their handset in the bathroom or toilet!

Other research has reported that more than half use their phones in the morning before they go to school (52 percent of phone owners; 37 percent of all 5 to 16 year olds), and almost half use them in bed at night (45 percent of phone owners; 32 percent of all 5 to 16 year olds).

To find out more...


Some Water Facts
Fact Sheet 5

- Water is made up of two elements, hydrogen and oxygen. Its chemical formula is H₂O.
- Water is the only mineral that is found naturally on Earth in three forms: liquid, gas, solid.
- Water regulates the Earth’s temperature.
- There is the same amount of water on the earth today as when the Earth was created.
- Most of the water on the planet is salt water that is undrinkable. In fact, 97 percent of the water is in the oceans.
- Two percent of the earth’s water is ‘locked’ in glaciers and ice caps.
- Thirty percent of fresh water is in the ground. For example, the largest liquid source of fresh water in the world is under the Sahara desert.
- The average Briton uses 160 litres a day. The average American uses 400 litres a day.
- The average person in the Majority World uses 10 litres of water every day for their drinking, washing and cooking.
- By 2025, half the world’s population could be short of water.
- Over one billion people do not have access to clean and safe water. That’s roughly one-sixth of the world’s population.
- 2.5 billion people have nowhere safe or private to go to the toilet.
- In developing countries, as much of 80 percent of illnesses are linked to poor water and sanitation conditions. Half of the world’s hospital beds are filled with people suffering from a water-related disease.
- Lack of fresh water can cause disease. Each year 2.2 million people – mostly women and children in the Majority World – die of diarrhoea, due to dirty water. About 4000 children die every day from diseases caused by poor sanitation and unsafe water.
- In the past 10 years, diarrhoea has killed more children than all the people lost to armed conflict since World War II.
- Nearly one in every five deaths of children under the age of five worldwide is due to a water-related disease.
- Together, unclean water and poor sanitation are the world’s second biggest killer of children.

- Ill-health means that poor people have to spend money that they could otherwise spend on things like food and clothing on medicines.
- Tens of millions of children cannot go to school as they must fetch water every day. Water is mostly collected by females (64 percent). By not going to school, they lose out on an education. This means they are more likely to stay poor as adults. The closer girls live to a water source, the more often they attend school.
- Over half of the Majority World’s primary schools do not have access to water and sanitation facilities. For girls, the lack of clean water and sanitation facilities close to home and in schools means that most of them drop out of school by the time they reach puberty.
- When females have access to clean water and sanitation, the benefits are long lasting. They are healthier and can attend school and contribute to their communities.
- If we did nothing other than provide access to clean water, without any other medical intervention, we could save two million lives a year.

Sources of Information:
www.kindplanet.org/kindkids/rainexper.html
www.waterwise.org.uk/pages/fun-facts.html
www.wateraid.org/documents/water_facts.pdf

Weird fact!
Human blood is 83% water

Weird fact!
The water that you’re drinking contains molecules from the water that dinosaurs drank!

Weird fact!
Water can dissolve more substances than any other liquid, including sulphuric acid!
The Millennium Development Goals: The Role of Water
Fact Sheet 6

2015 MDGs

1. Eradicate extreme poverty and hunger.
   - Prevent disease = better health.
   - Water for agriculture = growing adequate food.
   - Local Water = avoid buying water at great cost.
     Also frees woman and girls to go to school or work.

2. Give every child a primary education.
   - A nearby supply = girls can go to school.
   - Sanitation facilities for girls at school.
   - Better health = better attendance.

3. Promote gender equality and empower women.
   - A nearby supply = girls can go to school and women can work, just like men.
   - Less disease = less time caring for the sick.
   - Better sanitation & separate facilities.
   - Less maternal mortality.

4. Reduce child mortality.
   - Clean water = fewer diarrhoeal deaths.
   - Clean water = fewer water-related diseases.

5. Improve maternal health.
   - Fewer water-related diseases = better maternal/female health.
   - Less health care money spent on preventable water-related illnesses.
   - Better childbirth conditions = less maternal mortality.

   - Less incidence of disease = better outcomes for the sick.
   - Water to make milk formula for the babies of HIV-positive mothers to prevent transmission.
   - Less dirty standing water = fewer mosquito breeding grounds.

7. Ensure environmental sustainability.
   - Protect and preserve water supplies = key to healthy ecosystem health and combating climate change.

8. Build a global partnership for development.
   - See all of the above. Global development and progress on global inequalities are not possible without attention to water.

© UN Millennium Development Goals
The Millennium Development Goals: Problems and Solutions
Fact Sheet 7

2015 MDGs

1. Eradicate extreme poverty and hunger.

Problem: more than 30% of children in Majority World countries (about 600 million) live on less than US $1 (about 65p) a day. Every 3.6 secs someone dies of starvation, usually a child under 5.

Goal: reduce the number of people living on less than $1 a day by half = reduce the number of people suffering from hunger by half.

2. Give every child a primary education.

Problem: According to the UN in 2005, about 100 million children in the Majority world did not attend primary school. Most were girls.

Goal: ensure that every child can go to primary school. Education is a human right and gives you choices and the confidence to take advantage of those choices.

3. Promote gender equality and empower women.

Problem: two-thirds of the world’s 799 million illiterate adults aged 15+ are women.

Goal: make sure females can go to school and training. The UN reports that educating girls raises economic productivity, lowers infant and maternal mortality, improves nutrition, and promotes health.

4. Reduce child mortality.

Problem: about 11m children under 5, mostly in the Majority World, die each year (21/minute) from preventable causes. An Ethiopian child is 30 times more likely to die before their 5th birthday than a child in Western Europe.

Goal: Reduce the number of deaths of young children by two-thirds. Evidence shows that 2/3 of children who die each year could be saved by vaccines, antibiotics, bed net, and better diet.

5. Improve maternal health.

Problem: a woman dies in childbirth every minute (about 529,000 each year), most of them in Majority World countries. Many of these deaths are preventable.

Goal: improve the health of mothers and reduce maternal deaths by three-quarters. Ensure that women have access to skilled care in pregnancy and for at least one month after birth.


Problem: Malaria kills a child every 30 secs. HIV/AIDS, malaria, measles, polio, and TB threaten the lives of millions of children who would survive if they lived in better conditions.

Goal: Fight diseases that can be prevented and treated. Research, education, and tried & tested measures (like mosquito nets) can reduce deaths.

7. Ensure environmental sustainability.

Problem: A child dies every 15 secs from diseases due to unsafe water and poor sanitation. 1.1 billion people have no access to clean water.

Goal: reduce by 1/2 the number of people without clean water and sanitation. When governments are able to adequately treat and dispose of waste water = better conservation and less waste.

8. Build a global partnership for development.

Problem: many poor countries are in debt to rich countries and cannot develop their economies.

Goal: help to create better, fairer business and trade opportunities that reduce poverty and help everyone in the world. Governments, organisations, and businesses can work together.
