

GENE MEME teaching activities

Angkor

Key stage 1

GENE MEME is an art project about rising global population. The education programme encourages children to develop skills essential to a sustainable future: www.genememeart.blogspot.com

Overview of programme of study

This programme of study is divided into two sections: a look at modern consumption followed by a study of how the ancient city of Angkor became the largest in the pre-industrial world, until the growing population put such pressure on its water-storage system that it collapsed. All necessary information is given in this document. Links are included to on-line video clips to bring the information alive.

Part 1 – What we use today

Encouraging students to think about how much they consume. The combination of direct observation and guided analysis is intended to give pupils the basis for serious discussion about complex issues which affect their lives as well as enabling them to better connect with the historic story which follows. Activities include:

- **Lesson 1 – What we throw away**
Collecting containers, sorting and analysing them.
Communicating findings to the class.
- **Lesson 2 – A visit to the school kitchen**
To see scale of consumption and to think about volume, number and scale. Homework task to track water use.
- **Lesson 3 – Our water use today**
Use of maths to track volume, comparing daily, weekly and monthly figures, making a bar chart. Considering other things we consume – oxygen, electricity.

Part 2 – The ancient city of Angkor

Giving children access to a historic society which was extremely successful until it collapsed because its population put too much pressure on its complex water-storage system. Activities include:

- **Lesson 4 – Introducing Angkor**
Geography, investigating landscape – understanding that weather is different around the world. Discussion of practical impact of monsoon rain on farming.
- **Lesson 5 – Think like a water engineer**
Science, exploring water engineering in the sandpit/school grounds. Understanding levels and gravity; the basis of Angkor's success.
- **Lesson 6 – A religious landscape**
Religious Education, exploring Hindu and Buddhist myths. Seeing how Angkor's entire landscape was created in response to Hindu mythology.
- **Lesson 7 – Making a procession**
Reading an eye-witness account of the king's procession in ancient Angkor and enacting it. Art – Drawing a character from the procession.
- **Lesson 8 – Letter to the king**
English, discussion about the complexity of the society and the resources it would need to maintain it. Writing a letter warning the king of the possible consequences of over-consuming.

Lesson 1 - What we throw away

Before starting this unit, send a note home with your pupils asking them to collect containers of things their family consumes in ONE DAY - small boxes, cereal packets, jars, drink cans, milk cartons, yoghurt pots etc. Remind them to wash everything carefully so it can be used to make a display at school.

Discussion and analysis in groups

Lay out what the class has brought in. This is what was consumed in one day. Consume means 'use up'. Do you have any comments about what you see here? Does it seem a lot or not much?

Think like a scientist

Scientists make observations about the world around them. They look carefully and ask logical questions to understand things better.

Work in small groups. Here are some questions to get you started, what other questions can you think of?

- Why do we need packaging (to keep products safe, make them seem attractive, give information about a product)?
- Divide the containers into essential and non-essential items.
- How many have a short shelf life? How many are long-life
- How can you tell?
- What is the packaging made out of?
- How could you reduce your overall packaging waste?
- What happens to packaging (land-fill, recycling)?
- What symbols are used on packaging to show it can be recycled?

Consider what else we consume which isn't shown here (electricity, gas, petrol, water, oxygen).

Make a display of your packaging for the rest of the school to see. Make posters showing your conclusions about how much you all consume.

Lesson 2 – A visit to the school kitchen

Visit the school kitchen while the staff are preparing lunch. Before you go, think about good questions to ask.

For example

- How many meals do they make in a day?
- How long does it take?
- How many portions fit into each tray/pot?
- Is there much waste?
- What happens to it?

Maths work

You have seen the canteen. What do you eat and drink on a normal day for lunch? Draw a picture of it.

Now draw what you have for a normal breakfast and a normal evening meal. This is what you eat on a normal day.

If you can, use maths to work out how many glasses of drink you have in a week. How many plates of food. You might find it helps to draw the plates and the cups.

Show the class the attached document: “What do you eat in a day?”

<http://www.gregorharvie.com/teaching%20materials/day.pdf>

followed by the document “What do you eat in a week?”

<http://www.gregorharvie.com/teaching%20materials/week.pdf>

Extension task

How much do you think a single person would eat in a year?

Homework

Introductory discussion

We’ve talked a lot about food, but there’s something more basic than that, something it is impossible to grow food without. If we didn’t have it we’d live in a desert. Let’s talk about how much water you use.

Show them a one-litre bottle to give them a sense of scale.

Drinking

When people talk about trying to limit the water we use, they **never** tell people to limit how much they drink. Why do you think that is?

- Our bodies are mainly water
- It would do us harm to stop drinking
- The amount we drink in a day is so little in comparison to flushing the toilet just once!

So don’t stop drinking.

Hand out the water-use sheets for the class to fill in at home with their parents.

<http://www.gregorharvie.com/teaching%20materials/water.pdf>

Lesson 3 – Our water use today

Capacity work, maths

Discuss what you found out by filling in the sheets on water use.
Turn your figures into bar charts

Discussion

In the UK, every person uses 100-160 litres of water a day, one third of household water is used to flush the toilet.

In developing countries each person uses only 20 litres a day.

Extension task - If everyone uses 150 litres a day, how much does the class use in one day?

But is that really all the water you use? What about

- Cleaning?
- Cooking, adding to foods?
- Having fun – swimming, sailing?
- Farming – growing plants and animals for us to eat?
- Making things?

Water is used as an ingredient (raw material) in many industrial processes. It is used to cool things down, to make substances easier to spread or to stop things drying. For example, the paper industry uses lots of water when it chops trees and mashes them into a pulp to make into paper. Inks and printing use lots of water too, so even though paper is dry it uses a great deal of water.

(Teacher's note – more accurate figures of water use by industry are included at the end of this document.)

Conclusion

Does it matter how much we consume? What would happen if we stopped consuming – to ourselves, to companies and the economy?

Our society is based on the idea of consumerism – that is manufacturers making things which shops sell. Everything is set up so each person in the chain makes a profit. The person who makes an item sells it to an agent at a profit. The agent (called a wholesaler) sells it to the shop at a profit, and then the shop sells it to you at a profit. Talk about profit. Who pays it?

Next time we're going to look at a city which managed its water so well that it grew and grew and grew, until one day it found out that even the most successful city on the planet had reached its limit.

Lesson 4 – Introducing Angkor

Geography

Where is Cambodia? Look it up on a map.

Three quarters of Cambodia is low-lying. Its central plain has a lake called Tonle Sap (Great Lake), because it grows to nearly ten times its normal size in the rainy season. The weather is very different in Cambodia. Most of the rain falls between September and October which is also its coldest time. Its driest time, between January and February, is extremely hot.

Think like a farmer

What does the weather have to do to make a farmer's seeds grow?
When does the rain need to fall? When does it need to be hot?

Watch this video of the monsoon in Cambodia (32 seconds)

<http://www.youtube.com/watch?v=HhUdFO2duGc&feature=related>

What problems do you think rains like this would cause a farmer?

How could they be solved?

Present your ideas to the rest of the class.

Whole class

We're going to look at how the people who lived in Cambodia a thousand years ago came up with a very clever answer to the problem of how to harness the monsoon rain.

Watch this video (14 minutes)

- http://www.youtube.com/watch_popup?v=IN46a_PjKFM

(Teacher's note – After 15 minutes the film moves onto recent history which may be inappropriate for this age group.)

Quick questions - How carefully were you listening?

What is Angkor Wat?

What religion is the site? Why is there a Hindu influence?

What were there five towers on Angkor Wat?

Why do you think the local people put so much time into the site?

What were the carvings for?

Explain to the class

About seven hundred years ago, Angkor was the biggest city in the world. They lived in a difficult environment that got rain when it was cold and was dry in immense heat. The city did well because of how it managed water. It created huge reservoirs to store the water when it rained and keep it until it was needed. And as well as that, the engineers understood that water only moves down hill.

Over hundreds of years, the local people built hundreds of miles of canals that relied on small differences in the level of the land to move water from the rivers flowing out of the hills into the huge water storage reservoirs. Some were five miles long and one and a half miles wide.

In the monsoon months, overflow channels took away the extra water. After the rains stopped in October or November, irrigation channels took stored water to the fields. The storage lakes also helped keep soil moist by allowing water to soak into the earth. In surrounding fields, the heat of the sun would have drawn up the ground water for the crops. It was an incredibly clever system.

Lesson 5 – Think like a water engineer

Science experiment – think like a water engineer

Resources needed

- A source of water – hose or containers
- An outside space such as bitmac – or a sand pit
- Plastic to stop water draining into sand/mud
- Plasticine
- Optional – a spirit level

Divide the class into groups.

Explain that they are going to act as water engineers on a mini-Angkor development in the playground.

They need to create = dams and reservoirs from the water to ensure they have enough water for the harvest. They need to manage the water as teams.

Each group could survey their area, asking

- What is the highest point?
- Where does it slope most?
- Where is it level?

Back in the classroom

Get the teams to feed back on what they discovered. Were they good at judging levels? What happened to the water?

Write up the experiment with the class, adopting the formal experiment conventions.

Lesson 6 – A religious landscape

Religious Education

As Angkor grew in success, more and more temples were built until there were nearly a thousand. Angkor Wat, at the centre, was the biggest. Today it is still the world's largest single religious monument.



Watch the video – (6 minutes from ‘Wonders of the World’ series)

<http://www.youtube.com/watch?v=hXl9WNzZdmI>

This talks about the Hindu phase of Angkor.

The city is laid out according to the Hindu sacred texts or ‘puranas’. The universe is centred on Mount Meru, ringed by a series of circles. The first is ‘jambudvipa’, the land of the rose apple tree. Look at pictures of “The Churning of the Sea of Milk” and talk about the story.



Watch the video (6 minutes from ‘Wonders of the World’ series)

<http://www.youtube.com/watch?v=EOZG1npiChg&feature=related>

This programme talks about the Buddhist phase of Angkor, focusing on the faces.

Lesson 7 – Making a procession

Class procession

Read this text describing a king's procession as seen by a Chinese visitor in 1296 to the class.

“When the king goes out, troops lead the escort; then come flags, banners and music. Palace women, numbering from three to five hundred, with flowers in their hair, hold candles in their hands. Even in broad daylight, the candles are lighted. Then come other palace women, the king’s private guards, and carts drawn by goats. Horses, all in gold, come next. Princes come sitting on elephants, and you can see from far away their red umbrellas. After them come the wives of the king. They have more than one hundred parasols. Behind them comes the king, standing on an elephant, holding his sword in his hand. The elephant’s tusks are encased in gold.”

Talk about the complexity of the society described and the resources it would need to maintain it. How many people do you think were involved in the procession?

Divide the class into the groups described - troops, flag holders, palace women, the king’s private guards, princes, wives and then the king. Use any props you can find and enact the procession round the classroom.

Art

Draw a character from the procession. Before you begin think about how best to show the energy and noise of the procession. Decide whether to use paints, crayons or pencils and what colours you think you should include. Be ready to talk about what you have drawn.



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1 http://www.visitangkortemples.com/travelogue/wp-content/uploads/2008/09/angkor_wat_59_tn1.jpg

2 <http://www.sacred-destinations.com/sri-lanka/images/tooth-temple/wesak-parade-cc-jungle-boy.jpg>

Lesson 8 – Letter to the king

Population rise

The word Angkor comes from the Sanskrit 'nagara', meaning 'holy city'. More and more people came. The city got bigger and bigger until it covered 1,000 square kilometres. Researchers think the whole area supported up to one million people.

An inscription at Ta Prohm says that 12,640 people serviced that temple alone. The writing also explains that more than 66,000 farmers produced nearly 3,000 tons of rice a year to feed this multitude of priests, dancers, and temple workers for this temple alone.

What do you think might have happened?

Experts think a number of things happened, one after the other.

- The religion changed from Hinduism to Buddhism, this meant the society wanted to be more equal, so some people may have refused to work.
- The way the water was managed began to fail. Pollen samples show some reservoirs dried out.
- The weather got bad. There were extremely wet spells (in which experts think the walls of the reservoirs may have collapsed, losing the water) followed by droughts.

Because so many people lived in the city, it would have been difficult to cope. Lots of people worked in the temples, needing farmers to support them. When their crops failed the whole city would have been in trouble. Angkor's clever water engineers enabled people to create a very complicated big city. But it got too big to be able to deal with problems. What lessons do you think this has for today?

Writing

Pretend you live in Angkor. You saw the king's recent procession and you decide to write him a letter warning him about what might happen if everyone keeps consuming so much.

- What words and phrases might be good to use to a king?
- How should your letter begin?
- How should it be laid out?
- What details might it include?

Additional information

- <http://www.youtube.com/watch?v=BxPHaXhOt7Y> – 3-minute video of Americans visiting a woman in a floating village talking about food
- <http://whc.unesco.org/en/list/668/video> – short video of sculptures
- <http://www.world-heritage-tour.org/asia/southeast-asia/khmer-empire/cambodia/angkor/map.html> – interactive map

Main uses of water by industrial sector

Industry sector	Use
Electricity and gas production	5 610
Domestic	3 250
Fisheries	2 060
Water supply (including leakage)	1 750
Chemicals	670
Agriculture	370
Metal manufacturing and products	330
Other services	310
Food, drink and tobacco	300
Pulp, paper, printing and publishing	210
Education and health	190
Other manufacturing including recycling	160
Wholesale, hotels and catering	140
Manufacture of machinery	110
Textiles	90

Use = million cubic metres

Source: *Environment Agency, Scottish Executive, ONS*

figures are for 1997/8

Lesson 5 uses an edited and simplified version of Zhou Daguan eye-witness account of the king's procession in 1296. Here, for reference, is the original:

“When the king goes out, troops are at the head of the escort; then come flags, banners and music. Palace women, numbering from three to five hundred, wearing flowered cloth, with flowers in their hair, hold candles in their hands, and form a troupe. Even in broad daylight, the candles are lighted. Then come other palace women, carrying lances and shields, the king's private guards, and carts drawn by goats and horses, all in gold, come next. Ministers and princes are mounted on elephants, and in front of them one can see, from afar their innumerable red umbrellas. After them come the wives of the king, in sedan chairs, carriages, on horseback and on elephants. They have more than one hundred parasols, flecked with gold. Behind them comes the sovereign, standing on an elephant, holding his sacred sword in his hand. The elephant's tusks are encased in gold.”

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