

**PENINSULA
ARTS
WITH
PLYMOUTH
UNIVERSITY**

Soil Culture

Education Pack

Peninsula Arts

13 April – 30 May 2015



VISITING PENINSULA ARTS

Peninsula Arts has a growing commitment to making the best in the arts world accessible to young minds. We welcome all ages, from primary through to students in Further Education.

Before you book your visit we are happy to discuss your visit with you before you book, so please contact us with any queries or concerns before making your visit. All school groups must be supervised by an appropriate number of staff members from the visiting school and we advise teachers to visit the gallery space before making your visit. Peninsula Arts Gallery is fully wheelchair accessible.

Visiting the Peninsula Arts Gallery could not be easier and we welcome school groups of all ages. Our free talks and tours can be amended to suit any timeframe or learning stage and we can tailor your visit to incorporate activities and workshops which complement the exhibition.

Booking your visit for Soil Culture is essential, you can do this by emailing **outreach@plymouth.ac.uk** or by telephoning **01752 58 50 36**.

For more information on the arts outreach opportunities with Plymouth University please visit **www.plymouth.ac.uk/artsoutreach**

Peninsula Arts Gallery Visiting Hours:

Monday – Friday 13.00 – 17.00

Saturday 11.00 – 16.00

(closed Bank Holidays)

How to find us:

Peninsula Arts Gallery is situated in the Roland Levinsky Building on Plymouth University campus. It is adjacent to Plymouth City Museum and Art Gallery on North Hill.

Peninsula Arts, Roland Levinsky Building,
Plymouth University PL4 8AA

Email: **peninsula-arts@plymouth.ac.uk**

Telephone: **+44 1752 585050**

SOIL CULTURE EXHIBITION

PENINSULA ARTS GALLERY

13 APRIL – 30 MAY 2015



Soil – earth – muck – dirt – from agriculture to architecture, soil is essential to life on earth and continued human survival and development.

Grappling with this essential substance, the Peninsula Arts Gallery transforms itself into a soil laboratory using the Arts to inspire a deeper understanding of soil - a resource on which the whole of civilization depends but many take for granted.

Art and Science come together as the gallery hosts an international artist in residence, Lisa Hirmer. Linked to the latest research by Plymouth's Faculty of Science and Environment on the important role of peat in the ecosystem, Lisa will produce new work live in the gallery. We also present the beautiful and thought provoking work of artist Emma Saffy Wilson whose dirt paintings and sculptures question how language is often used to convey the usefulness of soil and earth.

The gallery will also host a number of live demonstrations and workshops on earth building techniques led by members of the Devon Earth Building Working Group, alongside an exciting range of films, talks and activities for everyone to get involved in. Come and Dig It!

SOIL CULTURE PROGRAMME

Soil Culture has been developed with the Centre for Contemporary Art and the Natural World in collaboration with Falmouth University. It is a contribution to the UN International Year of Soils 2015 and is supported by Arts Council England.

The Soil Culture programme uses the arts to inspire a deeper public understanding of the importance of soil. Spanning over two years, the project has organised forums and collaborative projects of writers, artists and environmentalists in various organisations in the South West.

The following organisations have been involved with the Soil Culture project: Royal Botanic Gardens, Peninsula Arts, Plymouth University, Daylesford Organic Farm, Bristol European Green Capital and Hannahs at Seale-Hayne.

THE CENTRE FOR CONTEMPORARY ART AND THE NATURAL WORLD (CCANW)

The Centre for Contemporary Art and the Natural World is a leader in the arts and ecology movement.

As society has become increasingly concerned over its changing relationship with nature, there has been a growing need for a dedicated exploration of these issues. Through exhibitions, talks, and artist residencies CCANW aims to create the platform to discuss these issues through which new understandings of the natural world can develop; using contemporary art that explores social, environmental and scientific issues.

www.ccanw.co.uk

CCANW



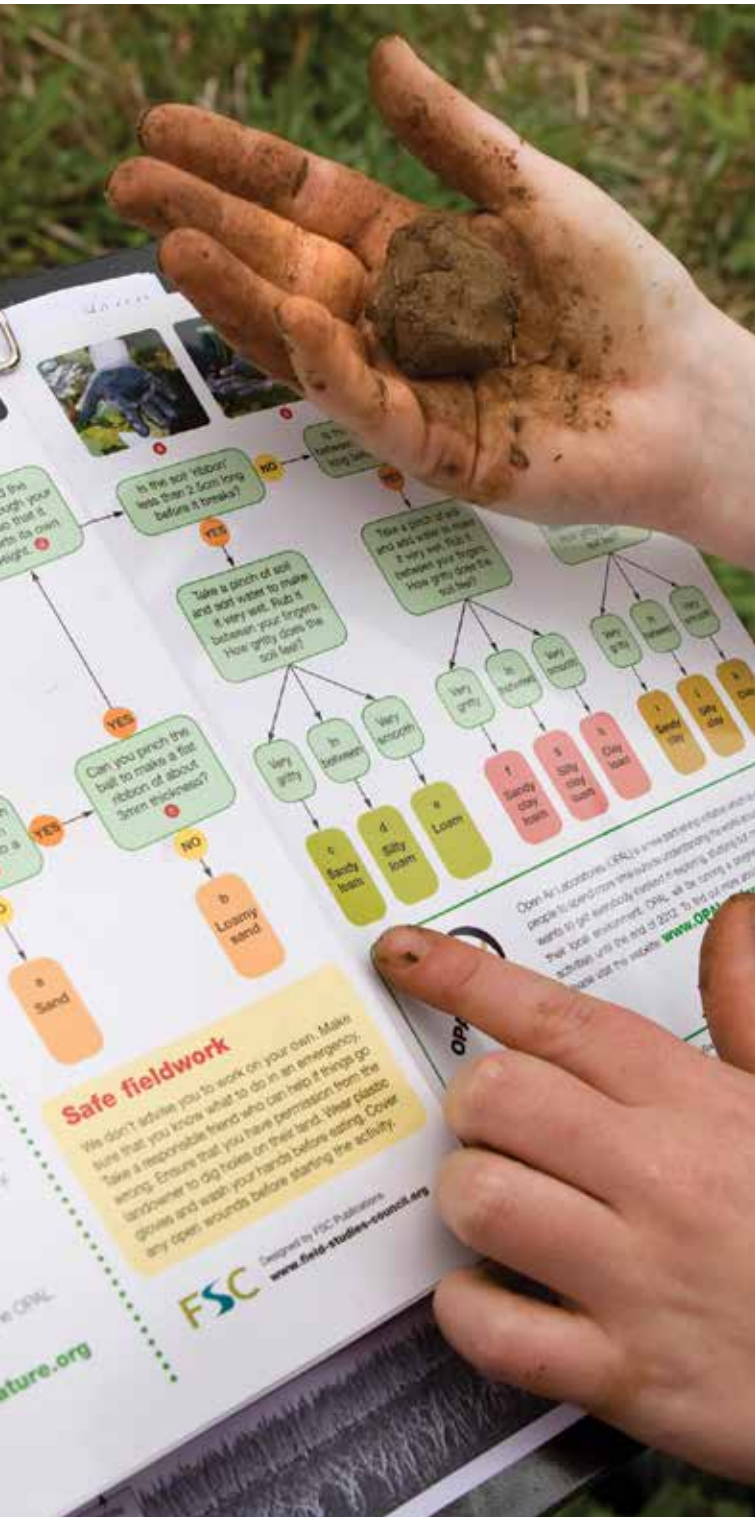
**FALMOUTH
UNIVERSITY**



Supported using public funding by
**ARTS COUNCIL
ENGLAND**

**PENINSULA
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THIS PACK IS INTENDED FOR THE USE OF SCHOOL VISITS AND THE PUBLIC.

It has suggestions of activities for in the classroom, at home or in the gallery.

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INTRODUCTION

Soil is an important natural resource. The soil layer on earth only 2 meters deep. That is a very small amount compared to the size of the earth. We use soils to grow our food. We can make pots, glass and even homes out of it. Soil is also able to clean our water supply making sure the environment can stay healthy. Archaeologists and historians value soil's ability to preserve historic remains. Animals, plants and humans all rely on soil for our survival.

1000 years

It takes thousands of years for soil to form so it is important for us to look after it. As the world population gets larger, we are under pressure to find the right balance of land used for food production and land used for housing. Once a building is built on soil the soil is very rarely used for agricultural uses again.

1 teaspoon

Soil contains billions of organisms. These organisms release the nutrients within the soil that plants and other living creatures depend on. They also are helpful for cleaning the soil. One teaspoon of soil contains more organisms than there are humans on the planet.

The scientists and artists in this exhibition are interested in peat soil. Peat soil is formed in watery conditions. It is made out of plant materials, such as moss, that have been compacted over thousands of years. Peat is commonly found in boggy areas such as Dartmoor.

ARTISTS

Fergus Mc Burney illustrated drawings (prints), School of Biomedical and Biological Sciences (Faculty of Science and Technology), Plymouth University

- Ground beetle larva, Carabidae
- Common cryptops centipede, *Cryptops hortensis*
- Slender springtail, Entomobryoidea
- House or latrine fly larva, Fanniidae
- European earwig, *Forficula auricularia*
- Mesostigmatid mite, Mesostigmata
- Common woodlouse, *Oniscus asellus*
- Soil or litter springtail, Poduroidea
- Featherwing beetle, Ptiliidae
- Rove beetle, Staphylinidae

Emma Saffy-Wilson is fascinated by the contrasting perceptions of soil and dirt. Her art explores the different meanings and values we give to 'soil and soiled, earth and dirt'. Soil conveys something wholesome, fertile and valuable, while dirt is perceived as bad, contaminated, and worthless.

In a studio filled with roots, branches, and bones, Wilson uses mud, dirt and mould together with synthetic materials to create hybrid artworks that connect living and dead matter. She allows natural processes to play a key part in forming her artworks, where the forces of decay and destruction instead become agents of beauty and creativity.

Esme Stewart utilises the natural pigment of earth and minerals to create colour palettes. By using soil as a medium her work her paintings explore of the relationship between the landscape and formal art practice.

She uses the traditional technique of egg tempura to bind the pigments to the consistency of paint. Applying these paints using experimental techniques, her work investigates the properties the pigments. This is a process of discovery on how these natural materials can be used to mark and the qualities that the pigments retain.

Jamie Morrison's installation works responds to the interpretation of natural and man-made environments. Placing the viewer's in an environment made unrecognisable through the recreation (or relocation) of natural phenomena inside a man-made structure.

Soil gathered from Dartmoor is juxtaposed against soil gathered from in and around Plymouth city centre. Over time the different soils will degrade; resulting in a range of colours to appear as the soil slowly dries to a dusty pigment. Visitors are invited to participate by walking on the soil to accelerate its deterioration. This is to expose the influence of human interaction on natural habitats.

ARTISTS

Lisa Hirmer Artist in residence.

The Dodolab collective is an ever-evolving, experimental research programme that works to engage with innovative and thought provoking approaches to research. The aim is encourage a public engagement and dialogue surrounding key issues such as, the impact of human interaction on the environment and other species. The artist led project aims to work collectively with scholars from all disciplines to employ a playful critique that actively promotes open participation to stimulate this exchange of knowledge and conversation across cultures, generations, and disciplines- sometimes even species.

Dodolab uses a range of mediums and strategies to achieve their aims including public interventions, performative research, practice-based activism and community based arts and installation- operating both within and outside the frame of the conventional gallery setting and overlapping traditionally defined forms of art making with other realms. The focus is on a commitment to implementing art as a social catalyst in today's world.

Bringing the arts down to earth and celebration a coming together of Art and Science, Hirmer will be conducting "Peak Peat" as part of our Soil Culture exhibition. "Peak Peat" is an engaging interactive survey that involves Dodolab learning about carbon storage and the important role of peat in the ecosystem.

HOW IS SOIL MADE?

Soil contains minerals, air, water, organic materials and organisms. All are very useful for soil. Most soil is made from hard rock and sediment that has been worn down very slowly. This process is called 'weathering'. It can take almost 500 years to make 1cm of soil.



Soils look different depending on what they are made from. In Britain it is estimated that 700 types of soil are found. Depending on its 'parent soil' (the type of rock it was first made from) the properties of soil can vary. Soils contain rock

particles. The size of these particles will change the texture and colour of the soil. Three main types of soil particles are sand particles, silt particles and clay particles. These particles affect how much water and air the soil can hold. Particles are unusually shaped so they never fit perfectly together. This is really useful as water and air collect between the 'pores' of the soil.

- Sand particles are large and course. Sandy soils are good at draining water away from an area so that it does not get too flooded. However they are unable to hold nutrients for plants to grow.
- Silt particles are medium sized. They are okay at holding nutrients and water.
- Clay particles are the smallest. Clay soils feel smooth and velvety to the touch. They are good at holding nutrients. They hold a lot of water making the soil heavy and wet.

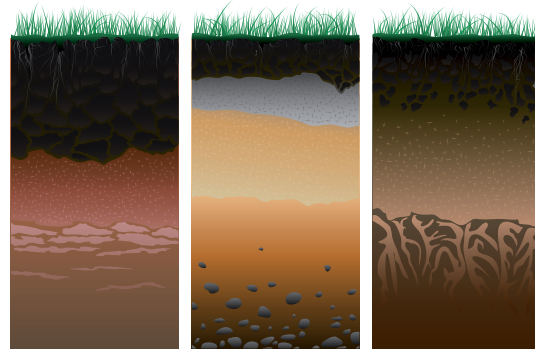
Loam soils have a mixture of sand, silt or clay particles. The soil 'structure' (the balance of the materials that make it) is important when considering what the soil can be used for.

ACTIVITY



Using microscopes in the gallery compare the different particles in the soil types.

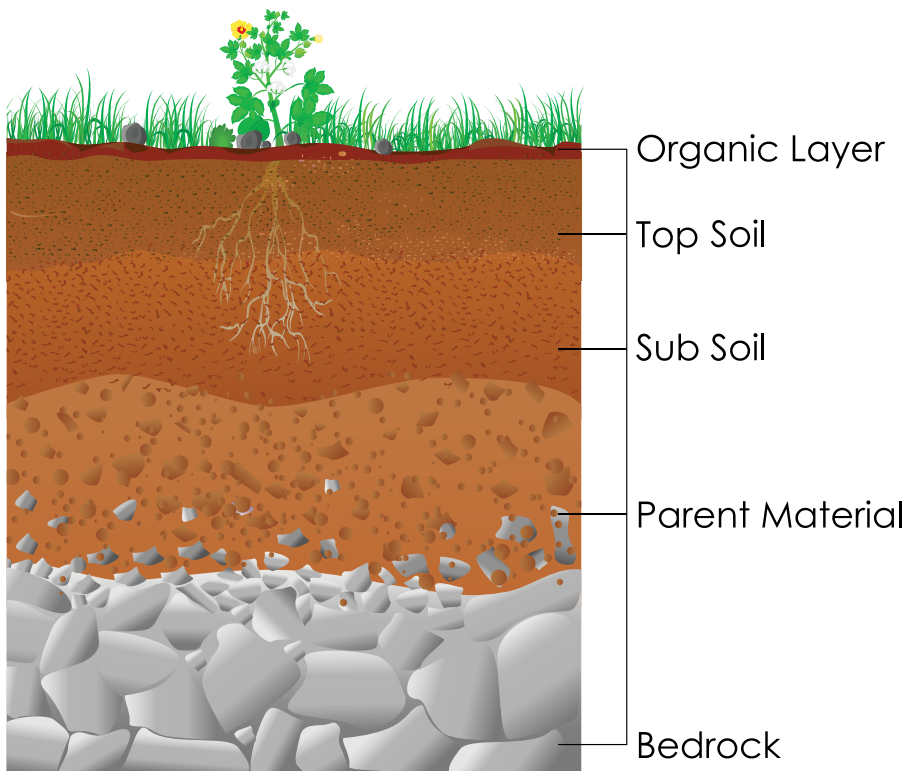
Can you name guess what type of soil it is?



Soil Layers

Soil is arranged in different layers. Scientists call these layers 'soil horizons'. They start at the surface layer and go down to the hard rock of the earth. There are usually three or four different horizons to the bottom. The top layer is usually a dark brown or black. It is made of 'organic matter'. Organic matter is made out of decaying plants and animals. It is

important layer as it contains lots of nutrients. The many thousands of microorganisms that live in the soil help release the nutrients. The deeper layers of the soil are lighter and become more varied in colour. Scientists are not able to determine what type of soil they are looking at until they reach these deeper levels



ACTIVITY

Match up the Key words to their meaning

Peat

The gaps between rock particles where water and air can be found.

Weathering

The term for the different layers found in soil

Organic matter

Found in the top surface of soil. It is highly nutritious for plants. Made out of decomposing plant and animal remains

Soil Horizons

The process when rocks are worn down over time.

Pores

A rare type of soil found in boggy wetland conditions. Made out of plant materials

WHAT DO WE USE SOIL FOR?

- Soil is very important for plants as it enables them to grow. We use this in our food production to make a wide range of plant materials that we and other animals eat.
- Plants can also become forests or other ecosystems where a variety of animals live.
- Soil monitors and affects the flow of water to lakes and rivers.
- Soil is used to make things like ceramics, glass and houses.
- Soil can preserve items of people who lived hundreds of years ago. These finds have been important for historians for understanding more about how people lived. Peat soil is good at this.



Did you know?

Gardening is proved to improve peoples moods. We can absorb a microbe called *Mycobacterium vaccae* through our skin. This microbe raises serotin – the thing that makes us feel happy!

PLANTS

Soils help plants to grow by doing three things:

- 1) They support the plant roots giving the plant a secure home.
- 2) They give the plant a supply of water
- 3) They produce nutrients for the plant to grow



The structure of the soil is important when growing plants. The structure can be affected by the climate and geographical location. The type of soil found in an area will determine what will grow there. Some plants will prefer dry soils or acidic soils whilst other plants will not be able to grow in those conditions.



The roots of a plant purposely seek out the water in the soil. If the soil is lacking water, such as in the summer, the roots have to grow into deeper layers in search of water. The deeper the roots the more secure the plant is in the ground. This is important for large trees that rely on their roots to be secure or else they will fall over.

Nutrients

Plants need nutrients to grow just like humans. They absorb the soil nutrients through their roots. There are 18 types of nutrients are needed for plants to grow including, calcium, magnesium and iron. When farmers or gardeners grow lots of plants in one area the nutrients in the soil can reduce. Fertilisers are used to help replace nutrients. There is a natural nutrient cycle but it can take a long time for soil to repair itself.

PLANTS

Nutrients move through the soil in cycles. Each type of nutrient has its own independent cycle. Most cycles rely on three major exchanges of nutrients. These are through animals and plants; through organic matter and through the weathering of minerals in the rock. The image below shows the cycle of nitrogen cycle.

Here are a few of the key process. Discuss why they are important using the image as a guide.

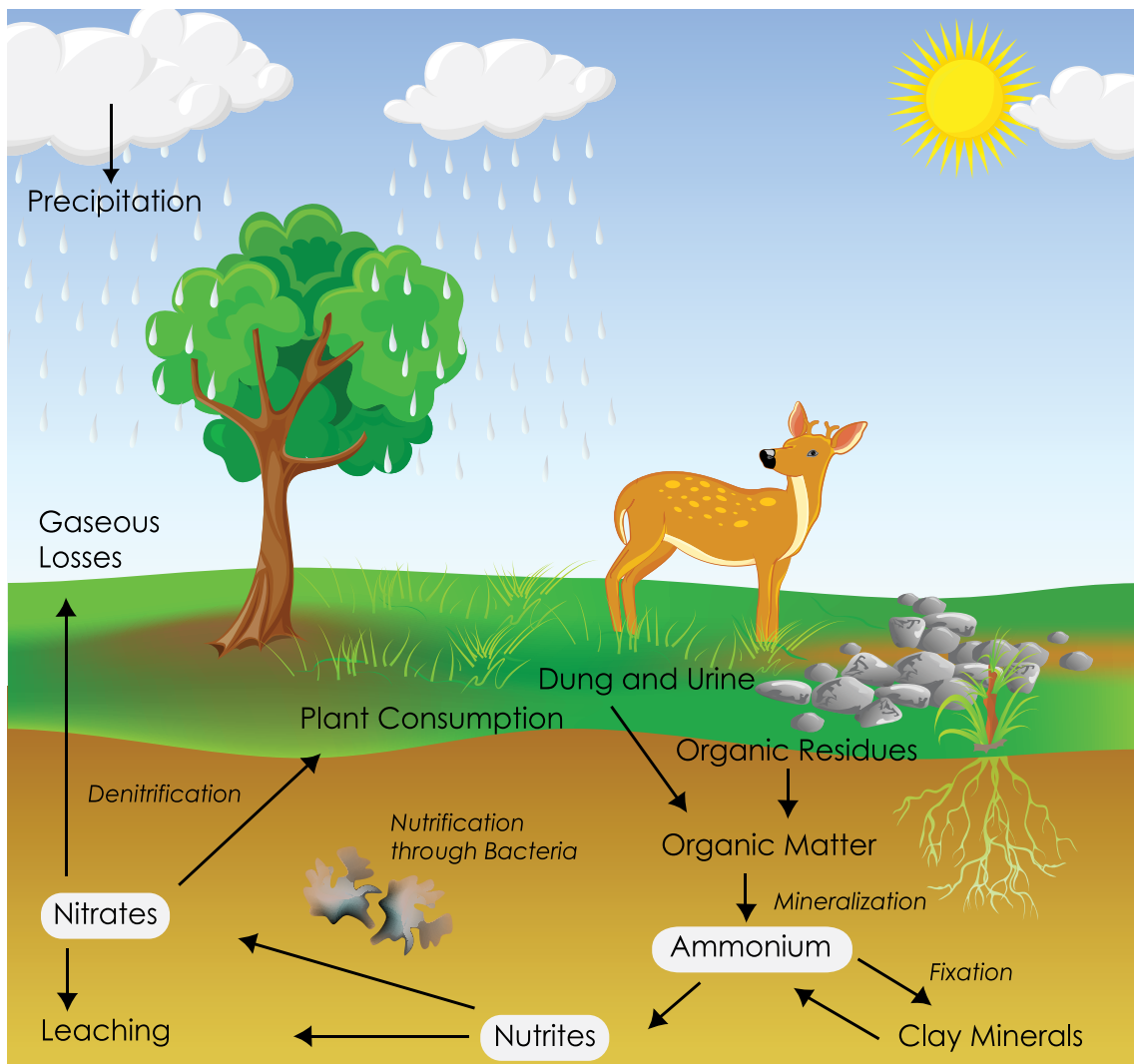
Dung and Urine

Lines for answers after each title.

Organic Matter

Rainfall

Plant consumption



WHO LIVES IN SOIL?

Soil is its own ecosystem. Millions of animals, insects and organism live and depend on soil. Some might build their homes in it. Others tell scientists how healthy the soil is. Some animals are even known to eat it!

Activity:

Here are some examples of different creatures that live in soil. Can you name them? Explain the connection between the organism and soil.

1



Answer:

.....

2



Answer:

.....

3



Answer:

.....

4



Answer:

.....

THREATS TO SOIL

Soil can become damaged which can cause lots of troubles for humans and animals. Scientists work hard to prevent and repair soil. Here are some of the threats to soil.

Soil Erosion

- Is the washing away or blowing away of the top layers of the soil
- Caused by water or wind
- The soil is unable to restore itself as fast as we use it. This means not only is there less soil. There is less soil that is able to grow and support life.
- It is the biggest threat to soil.

Salination

- Caused by too much salt in the soil
- Common in countries with a hot climate and little rainfall
- Few plants can grow in this type of soil. Resulting in reduced crops and at the very worst it can create deserts
- Fixing the soil is difficult; it is easier to try preventing to soil becoming a saline soil.

Loss of Organic Material

- Caused by agriculture and human contact which breaks the natural 'nutrient' cycle of the soil
- Creates a lack of biodiversity in the soil. Fewer organisms are able to live there.
- Fertiliser can replace the nutrients that organic material but does little to help with the soil structure. This means that there is a greater risk of soil erosion.
- Organic soils, also known as peat soils, take a long time to make and are very fragile.

Pollutants

- Caused by disposing waste into the environment. This can be sewage, synthetic chemicals or metals.
- Changes the structure of the soil.
- Less organisms are able to live in the soil
- It can end up damaging the health of plants, animals and humans.

Building on soil

- Land which has been built on is rarely used for agricultural land again as it may have been contaminated by pollutants
- Dividing land between agricultural uses and homes is complicated
- World population has expanded which creates more demand for homes and food.

PLANTS

Soil is constantly on the move. Can you list of all the ways soil can get from one place to another

(i.e. on peoples shoes)

.....

.....

.....

.....

.....

.....

Why do you think it is important to repair soil?

.....

.....

.....

.....

.....

.....

In groups, pick a 'threat to soil' and discuss ways that we can protect or reverse the damage? Have a class discussion explaining your ideas.

Consider things like 'How long it will take to do this', 'if it has any other consequences' etc.

MAKING HOMES OUT OF SOILS

Before the invention of concrete and steel it was common for many people to make houses out of soil. Many people around the world still do this. These houses are known as 'Cob' houses. To create them you have to make a mixture of sand, clay and straw and water. The mixture is then formed into walls and trodden on to make it strong. Cob houses tend to have very thick walls. People who own cob houses like this as in the winter the houses stay warm and in the summer they are cool. It is more common for people to make brick houses. Bricks are made out of clay that has been baked in very high temperatures.



Soil Mechanics

Most buildings and other structures are not made out of soil anymore. However, soil remains the foundation to everything. 'Soil Mechanics' have to assess the composition of the soil to make sure it will be okay to build on. Soils that contain a lot of clay shrink when dry. This can cause a lot of problems for engineers as it means the foundations of the buildings are unstable.

When a house is built on soil it is then considered as being 'sealed'. When the soil is sealed it will never be able to be used to grow anything again. This worries a lot of people as the world population is growing. Scientists are trying to find the balance between soil for homes and soil for food.

DESIGN A HOME

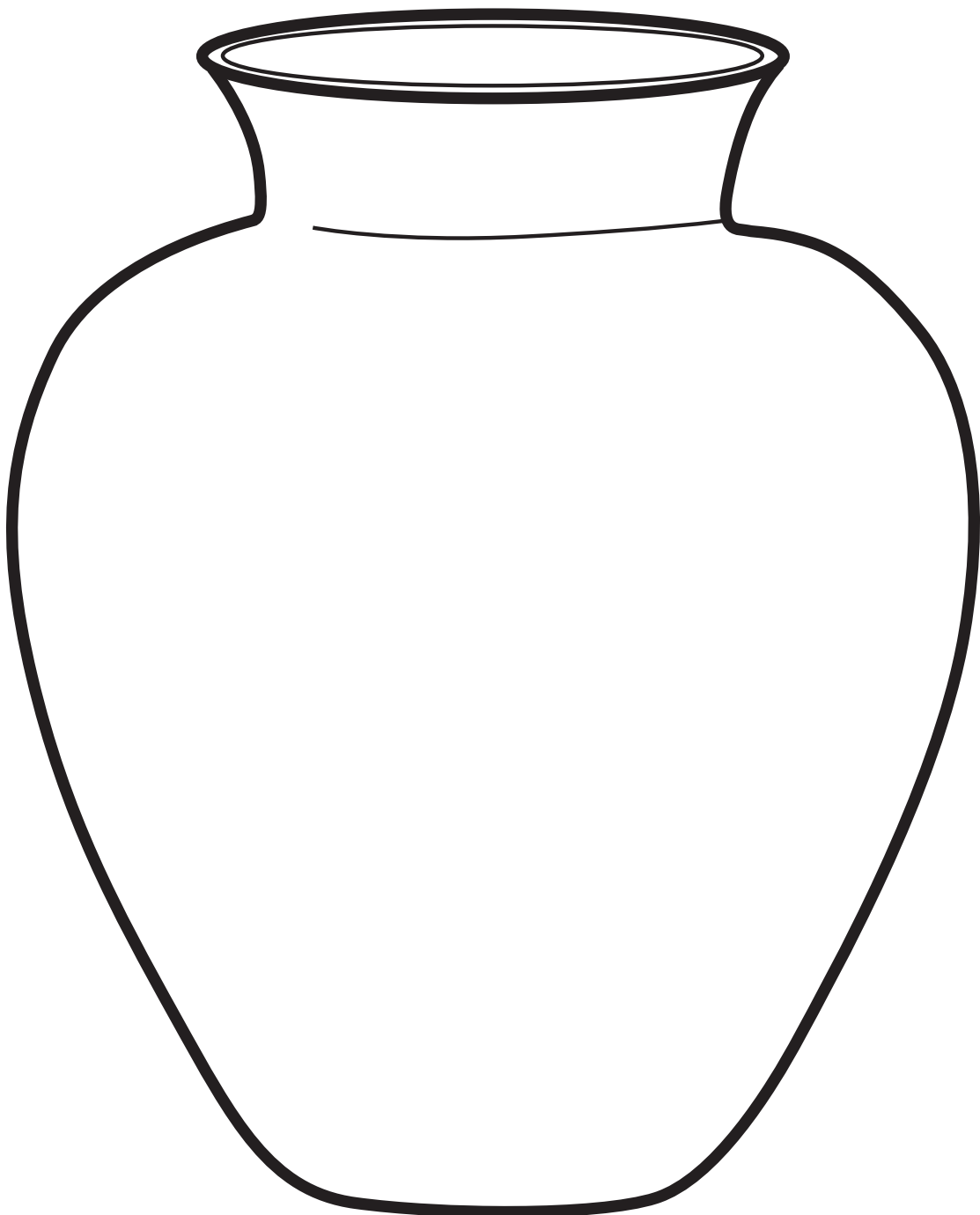
Draw a picture house you would like to live in.
Would you like it to be a cob house or a brick house?
Will your house have a garden? Will any animals live
there too?



Ceramics are made out of clay that has been baked in very high temperatures. Different types of clay make different

quality ceramics. Potters and artists enjoy making functional and beautiful ceramic products such as plates and vases.

Decorate this vase!



PEAT AND ITS IMPORTANCE

Peatlands cover 12% of the UK.

Peat is made out of organic material that has formed in watery conditions. The soil can consist as much as 50% organic matter which means it contains high amount of nutrients. This makes peatlands places that are highly diverse in terms of the types of plants and animals that are able to live there.

Peat used to be popular for agricultural uses because of its nutrients. However to do this farmers often would have to drain the water content of the soil first. Peat becomes very fragile and shrinks when its water is removed. It is estimated that about 80% of the UK peatlands is damaged. Environmentalists and scientists are concerned about restoring peat, as it is very valuable to our ecosystem. This is proving difficult to do as, like most soils, peat takes an incredibly long time to form.

Future worries

Scientists are also interested in peat soil as it may help with climate change. The world has always experienced climate change. However, many people are concerned about the rate at which climate change is happening. Climate change is believed to be influenced by gases in our atmosphere. The balance of the types of gases found has been disrupted due to advancement of technologies (i.e. cars, planes). Carbon dioxide is a gas that has been linked to climate change. Peat has proven to be good at storing carbon. Scientists are particularly interested in restoring peat back to health as it may help reduce the effects of climate change.



PEAT QUIZ

1 How much land is peatland in the UK?

- A 9%
- B 12%
- C 16%
- D 25%

2 What's the highest amount of organic content peat can consist of?

- A 30%
- B 40%
- C 50%
- D 60%

3 Why are Environmentalists concerned about peat?

- A Peat contains too much salt so things can't grow
- B It is difficult to build houses on because its too wet
- C A large amount of the peatlands is damaged and this can affect the ecosystem that depends on it.
- D Peat is great for agriculture

4 Peat is good for storing carbon dioxide. This is good because...

- A Carbon dioxide affects climate change
- B Carbon dioxide is a nutrient that plants need to grow
- C Carbon dioxide is the main gas that we exhale into the air
- D All of the above

5 Which of these places can you find peat in the UK?

- A Plymouth
- B Dartmoor
- C Exeter
- D London

PEAT AND ITS IMPORTANCE

Carbon dioxide is the big baddy of climate change. The pictures below either depict things that make or reduce the amount of carbon dioxide. Can you rank them from highest (5) to lowest (1) Explain how they make or use carbon dioxide.



Ranked:



Ranked:



Ranked:



Ranked:



Ranked:



SOIL WORDSEARCH



ANTS
EARTHWORM
MINERALS
NUTRIENTS

ORGANISMS
PEAT
PLANTS
WATER

TEACHERS/PARENTS

Word Match Up (p9)

Peat A rare type of soil. ..

Weathering process when rocks are....

Organic matter Found in the top surface...,

Soil horizons The term for the different....

Pores The gaps between rock.....

Who lives in soil (p13)

Earthworms: live in the soil. Scientists use the presence of earthworms to gage how healthy the soil is.

Badgers/rabbits: build burrows in soil.

Parrots: eat soil for the nutritional benefits

Seeds: take root in soil to grow

Peat quiz (P21)

- 1 B 12%
- 2 C 50%
- 3 C A large amount of the peatlands is damaged and this can affect the ecosystem that depends on it.
- 4 D All of the above
- 5 B Dartmoor

Carbon ranks (P22)

Peat (1)

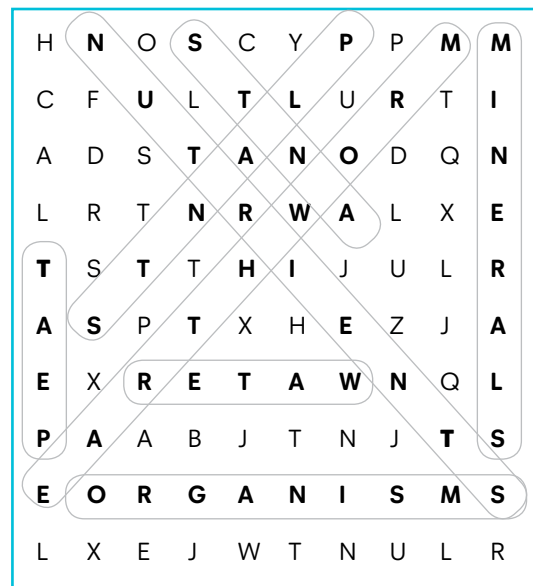
Trees (2)

Animals (3)

Cars (4)

Cooling towers (5)

Wordsearch (P23)



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Plymouth University
Roland Levinsky Building,
Drake Circus
Plymouth PL4 8AA

T: 01752 58 50 50

E: peninsula-arts@plymouth.ac.uk

www.peninsula-arts.co.uk