From Steaming Swamp to Blanket Bog

An exhibition of photographs taken on fieldwork in the Peruvian Amazon

Worksheet (Levels 1 and 2)

As you go round the exhibition, see if you can find out the answers to the questions below. The picture and caption where you can find out the answer is written in brackets, but to answer some of them you'll need to use your own knowledge, have a guess or talk it over with a friend.

You can find the answers to the questions below (and all of the pictures) on the exhibition website: https://peatlands.wp.st-andrews.ac.uk/educational-materials/, by clicking on the document, *Levels 1 & 2 Worksheet – Answers*.

1) What is peat made of? (1)

Peat is made of partially decomposed organic matter, that is, matter produced by living organisms. It usually includes the remains of leaves, roots, seeds, and wood, depending on what kind of plants live on the peat bog because it is the remains of these plants which build the peat.

In Britain, peat is mainly made of moss. In the Peruvian Amazon, tree roots make up most of the peat.

Soils are classified as peat if they contain over 65% organic matter, though between 90 and 100% organic matter is common in peat bogs. The non-organic portion of peat usually consists of inorganic, mineral sediments brought in by rivers or wind.

2) Is peat living, non-living or once-living? Talk to someone about the answer, it may not be obvious.

The bulk of peat is made up of "once-living" material. However, the plants that live on the surface at the present day are rooted in the peat, so the uppermost layers could also be said to contain some living material.

3) This palm tree is locally known as *aguaje* (pronounced ag-wa-he) and it is common in the peatlands of the Amazon region in Peru. Can you name the different parts by matching up the words to the correct parts in the pictures?

Leaves

Dead leaves

Trunk or stem

Fruit

4) What does this palm (and all other plants) need in order to grow?

Plants need carbon dioxide, water and sunlight. These are all needed for photosynthesis (the process through which plants make the energy needed to grow).

5) How many species of tree are there in a typical palm swamp? Or, as a scientist might say, how biodiverse is it? (3)

A typical palm swamp has an average of 38 species per 500 stems in the Peruvian Amazon. This is quite low for tropical rain forest – in unflooded areas nearby, the number of species per 500 stems is about 166.

6) These palms live in very wet soils, sometimes even in pools of water. Name one adaptation which helps them to survive these conditions. (4)

Aerial breather roots or pneumatophores help these palms to survive in very wet or flooded soils. Rising above the surface of the soil and above the water level, they act a little like snorkels, allowing gas exchange in the roots (root respiration: oxygen in, carbon dioxide out) through out the year.

7) Have you spotted the lizard? What is it called? (11)

The lizard in the picture is the South American Spotted Skink, *Copeoglossum nigropunctatum*. These are quite common in the tropical forests of Peru.

8) What can we use to find out how the plants growing on the peatland have changed over the last few thousand years? (15, 16)

Sediment cores from nearby lakes, or peat cores from the peatlands themselves, contain fossil pollen and spores. Pollen is produced by flowering plants, and spores are produced by ferns and mosses, in huge quantities. Pollen and spores can be transported by wind or water, and they end up in lake sediments and peat. Their characteristic shape, size and surface patterning enable scientists (known as palynologists) to identify which species of plant produced the pollen. By identifying and counting the pollen and spores in sediments and peat, palynologists can build up a picture of the vegetation which grew in the past, at the time each layer of sediment or peat was formed, and how it changed over time. The further down you go into the peat or the sediment, the further back in time you are looking. The oldest peat in the Peruvian Amazon that we know about is 8,000 years old. Pollen from the very base of the peat bogs tells us what the environment was like when the peat started to form, and after that how the vegetation changed through the life of the peatland up to the present day.

9) And what do we use to measure palm tree height? (18)

A tape measure (and a tree-climber!).

10) What instrument do we use to measure rainfall? (21)

A rain gauge.

11) What is the most usual way to harvest fruits of the *aguaje* palm? (22)

The most common method used to harvest fruits of the *aguaje* palm is to fell the tree.

12) What are the possible problems with this way of harvesting fruit? (22)

The problem with this method is that the palm tree does not regrow from the base, so the tree is lost for good. No further fruit harvests can be gathered from that tree in the future. If trees are felled faster than they can be replaced by new trees growing up from seed (and it takes between seven and ten years for a newly sprouting *aguaje* palm to mature and begin fruiting), then the amount of fruit available to harvest decreases over time. We say that the resource is being depleted.

The best alternative harvesting method is to climb the trees to harvest the fruit. This is difficult and dangerous as the trees are tall and smooth with no side branches. But it can be made easier with training and a suitable climbing harness. Increasing numbers of communities in the Peruvian Amazon are now starting to use this method, particularly in the national parks where felling the trees is not allowed.

13) How do many children in Amazon villages get to school if there is no school in their own village? (25)

By boat! There are no roads, but villages are well connected by rivers and streams.

14) What do the women in indigenous Urarina villages use to colour or dye the thread they make from palm trees? (28)

They use dyes extracted from plants which grow in and around the peatlands.

15) What is this thread used to make? (30)

The *Mauritia flexuosa* or aguaje thread is used to make textiles (fabrics) known locally as *ela* or *cachihuango*. These can be used as, for example, floor coverings and sleeping mats.

16) What is transported in the long metal tubes shown in picture number 31? (31)

Crude oil is transported in these pipes across the territory of the Urarina. They are taking the oil from the oil wells where it is extracted from rocks deep below the surface to processing points at the Peruvian coast, thousands of kilometres away.

17) There are many activities going on in the picture of the village Nuevo Pandora. Can you identify some of them and write them down? (32)

Some of the children are playing football, there is washing hanging up to dry, there are people resting in the shade of a partially completed house, some houses are being built, palm leaves are being prepared to form the roof of the house.

18) Have visited a peatland or a peat bog? Can you describe what the ground felt like?

Some ideas: peat bogs are generally very wet; a healthy one certainly should be. You can accidentally tread on an area of ground which looks solid but is, in fact, no more solid than water. A dry peat bog can feel bouncy when you jump up and down. You can feel the ground moving when someone near you jumps, even if they are a few metres away.

19) What do you think are the main threats to peatlands, their ecosystems and the people who live there, now and in the future?

The main threats to the intact tropical peatlands featured in the exhibition are: oil spills, oil exploration and extraction, depletion of resources such as palm fruits and animals which are hunted for food, possible future drainage of peatland areas for commercial agriculture (e.g. palm oil and cacao plantations), development of new transport infrastructure (e.g. railways, roads which make previously remote areas more accessible which in turn brings more people and increases the threats from deforestation and drainage), climate change.

20) Why do you think peatlands in the Amazon region but also in other places around the world, such as Scotland, are important to protect? (1, 33)

Some ideas: Peatlands are important as carbon stores – they store huge amounts of carbon below ground. And they are important because they sequester carbon from the atmosphere – they draw down carbon dioxide from the atmosphere and lock it up below ground. For both of these reasons, peatlands have an important contribution to make to reducing the amount of carbon dioxide in the atmosphere and thus to reducing global heating. They are important sources of subsistence and cultural resources for the people who live in peatland areas.

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