

LESSON PLAN

CREATED FOR TEACHERS BY EDEN'S EDUCATION TEAM

'Exploring Eden's Ecosystem' An insight into Eden's Rainforest Ecosystem

Activity Details

Eden's Rainforest Biome is a unique manmade ecosystem. In this series of lessons students create and investigate a simplified version of the food web for the Rainforest Biome. They will consider the role of different organisms in the biome and also what might happen if particular organisms were removed from the web – contrasting this to the role of 'Keystone' species in a real rainforest. They will discover that Eden's Rainforest Ecosystem is not as natural as it may first appear and that the scientists have to work hard behind the scenes to keep things in balance, particularly when it comes to dealing with pests. They will use the food web and some extra information from our Eden scientists to consider the merits of biocontrol versus pesticides to control pest populations in our biome. Finally, they will consider how we should effectively communicate this scientific information to Eden's visitors.

Year group: KS3 and KS4 Science students.

Activity length: A series of 3, 1 hour lessons.

Objectives and Curriculum links:

The lesson series is divided into three, 1 hour lessons:

Part 1: Getting to know the organisms living in the Rainforest Biome.

Part 2: Creating a food web for the biome.

Part 3: Pest management and communicating science.

These lessons enable students to:

- Explain how all the living things in an ecosystem have a role to play and are interdependent.
- Explain why ecosystems need to be kept in balance and how the scientists at Eden achieve this.
- Consider the importance of communicating scientific information to the general public.



LESSON PLAN

CREATED FOR TEACHERS BY EDEN'S EDUCATION TEAM

We've designed the lesson to help teachers cover the following **KS3 Science** curriculum links:

Interactions and interdependencies

- the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops
- how organisms affect, and are affected by, their environment, including the accumulation of toxic materials.

Genetics and evolution

- the differences between species
- the importance of maintaining biodiversity

These lessons will also help teachers cover the following key ideas from **KS4 Biology**:

- living organisms may form populations of single species, communities of many species and ecosystems, interacting with each other, with the environment and with humans in many different ways
- living organisms are interdependent and show adaptations to their environment

Levels of organisation within an ecosystem

- describe different levels of organisation in an ecosystem from individual organisms to the whole ecosystem
- explain how some abiotic and biotic factors affect communities
- describe the importance of interdependence and competition in a community.

The principle of material cycling

- recall that many different materials cycle through the abiotic and biotic components of an ecosystem
- explain the role of microorganisms in the cycling of materials through an ecosystem.

LESSON PLAN

CREATED FOR TEACHERS BY EDEN'S EDUCATION TEAM

Resources

You need the following resource to do this activity:

- Large pieces of sugar paper
- Pencils
- Post-it notes
- Pens
- Scissors
- Blu-tak
- Access to a computer room/laptops
- PowerPoint 'What's Eating You' ([resource 1](#))
- PowerPoint 'Hyperlinks to Organisms' ([resource 2](#))
- PowerPoint 'What's Eating You' – pictures ([resource 3](#))
- List of organisms for food web ([resource 4](#))
- Written description of food web ([resource 5](#))
- Pest management at Eden card sort ([resource 6](#))
- Access to the video clip on YouTube 'Eden's Wildlife Helpers'
- Computer linked up to a projector in the classroom

Prior learning

A basic understanding of ecology - drawing food chains and food webs, key terms such as producer, herbivore, carnivore, decomposer and detritivore would be helpful. The food web activity can be differentiated to make it accessible for different abilities.

Part 1: Getting to know the organisms living in the Rainforest Biome

Please note: part 1 could easily be set as a homework task if class time is limited.

Getting started (0-10 minutes)

Divide the students into groups of approximately 3-4. They will work with this group during the series of lessons.

Introduce the series of lessons and communicate the aims of the lessons ([resource 1 – slides 1 & 2](#)). Show video – 'Eden's Wildlife Helpers' (www.youtube.com/watch?v=pj7scDWSMYY).

These are some of the organisms that live in our Rainforest Biome. Just as with a real ecosystem each organism in our biome has a role to play.

LESSON PLAN

CREATED FOR TEACHERS BY EDEN'S EDUCATION TEAM

Research activity (10 – 45 minutes)

Show the students the list of the organisms from our Rainforest Biome ([resource 1 – slide 3](#)). Ask each group to divide up the list of organisms so that they have 4-5 organisms per student. It doesn't matter if they leave some of the well-known organisms out (for example earthworms and woodlice). Give the students 35 minutes to research their particular organisms on the internet. All the organisms have hyperlinks to websites with useful information to use as a starting point. It's useful if you can give students access to [slide 3](#) via a shared (teacher/student) drive on the school network – this way they can click on the hyperlinks. [Resource 2](#) is a PowerPoint which contains this [slide 3](#) for them to use. Ask them to try and find out the answers to these questions, but by no means do they have to find all of this information:

- Where does it live?
- Where does it get its energy from? (Is it a producer? herbivore? carnivore? decomposer? detritivore? - they may need clarification on what these words mean)
- What eats it?
- How is it classified?

They should also record any other interesting information they find out about the organism. For example: how does it hunt, avoid predators or move?

Extension opportunity: With more able students you could introduce the concept of a niche. They can record the information they discover in any way that they find helpful, a brain shower or a fact file in the back of their books might work well.

Finally: share what you know (45-60 minutes)

After their research session the students need to regroup on their tables. Ask each pupil to share the information they collected about the organisms they researched with the rest of their group. Make sure the group gets a chance to ask the 'expert' any questions – it's important that all group members get an idea of what each organism is. If members of the groups have questions that their expert can't answer encourage them to write them on the whiteboard. If students from other groups can answer the question then let them do so on the board. If some of the questions remain unanswered then set some of these unanswered questions as a homework task for the students in preparation for the next lesson.

Review the lesson aims ([resource 1 – slide 2](#))

LESSON PLAN

CREATED FOR TEACHERS BY EDEN'S EDUCATION TEAM

Part 2: Creating a food web for the Rainforest Biome

Getting started: Recapping the organisms (0 – 10 minutes)

Recap the aims of the lessons ([resource 1 – slides 1 & 2](#)).

Starter activity: Ask the students to review their research from the last lesson and to pick out the most unusual/interesting thing that they learnt about 1 of the organisms they researched. Share the piece of information they selected with the rest of their group. As a group decide upon 1 thing to share with the rest of the class. Ask each group to feed back this one piece of information to the whole class to promote discussion.

In addition, if the students were set homework questions from the end of the last lesson then share their answers to these questions now.

Group activity: Creating a food web for Eden's Rainforest Biome (10- 40 minutes)

Have [resource 1 – slide 4](#) on the board. Issue the students with the list of organisms for the food web ([resource 4](#)) and the written description of the food web ([resource 5](#)). Explain that the written description of the food web for the biome would, in reality, include far more organisms so it has been simplified. Also remind them that our Rainforest Biome is an artificial environment that we have created - but this perhaps makes it strangely unusual and interesting. In their groups ask the pupils to read out the description of the food web and step by step start to draw it on their large sheet of paper. Run through the instructions on [resource 4](#) with them before they start. I have included an extra PowerPoint ([resource 3](#)) with pictures of some of the organisms from the food web. This could be run on loop in the background whilst they complete the activity.

Differentiation: If you feel that building the food web from scratch is too complicated some students could use the blank template of the food web ([resource 1 – slide 5](#)) as a template. All the links are drawn already but the students will still have to work out from the description where the organisms need to go.

(Please note: This part of the lesson could be done as a whole class activity, outside using the pupils themselves and lengths of rope to create the web. Potentially you could photograph it from a higher vantage point such as a tower block if you have one at school).

LESSON PLAN

CREATED FOR TEACHERS BY EDEN'S EDUCATION TEAM

Envoys (40-50 minutes)

Once the food web is complete send 2 envoys from each group to another group to discuss the web that has been drawn and assess how well their diagram of the food web follows the description. Can the envoys help the group make any improvements?

Show the class the completed food web ([resource 1 – slide 6](#)). Their food web will look different to this but the most important thing is that they have linked the organisms correctly. There are 29 correct links on the food web on [slide 6](#). Ask the students to count how many correct links they have made. How did they get on? Show them the original food web drawn by the Eden scientists over a cup of coffee ([resource 1 – slide 7](#)).

Finally: Using the food web (50 – 60 minutes)

Use [resource 1 – slide 8](#). Give the students 3 scenarios to work through in their groups. These probably need to be written on the board. How would the food web be affected if:

- the trap-jaw ants were killed off by a parasitic fungi?
- we rake up all the leaf litter, poo and twigs to make it look tidier for our visitors?
- we trap and remove all of the geckos because visitors object to us having animals?

Collect feedback from the students on the implications of each of the possible scenarios. Discuss the idea that the species in the biome are interdependent. This means that changes in one part of the food web have implications for other organisms. This is exactly what happens in a real rainforest ecosystem. In addition some species have a bigger impact than others because they are connected to the other parts of the web in so many intricate ways. These species we call 'Keystone' species for example the jaguar in the Amazon or jungle elephants of the Congo. Loss of keystone species can lead to the collapse of a whole ecosystem – a house of cards ([resource 1 – slide 9](#)).

Review the aims of the lesson ([resource 1 – slide 2](#)).

LESSON PLAN

CREATED FOR TEACHERS BY EDEN'S EDUCATION TEAM

Part 3: Pest management and communicating Science

Getting started: Biocontrol in the biome (0-10 minutes)

Recap the aims of the lessons ([resource 1 – slides 1 & 2](#)).

Highlight specific organisms in the food web ([resource 1 – slide 10](#)) – Lacewings, gecko, ladybirds and parasitic wasps.

Show the students the first question on [slide 10](#). Ask the students to review [resource 5](#) and as a group decide upon the answer. Collect feedback from each group and then continue on to the second and third questions.

Q. What do these organisms have in common? A. These are used here at Eden; primarily for biocontrol (answer is in the text of [resource 5](#)).

Q. What does biocontrol mean? A. Biocontrol is when you use the natural predators and parasites of the pests to control their numbers (answer is in the text of [resource 5](#)).

Q. What is the alternative? A. Use of chemical pesticides.

Biocontrol and pesticides 10-20 minutes

Hand out the card sort activity ([resource 6](#)). Ask them to read the cards and group them in a way that they think makes most sense ensuring they have a heading for each set of cards. Ask each group of students for feedback – which headings have they picked and can they give examples of cards that are in those groups? Use this as a way of discussing key features of biocontrol and pesticides. If the students have come up with very different ways of grouping the cards then select particular cards and ask different groups to justify their placement of those cards and promote some discussion. Leave these on the table because they will help them with the next activity.

Signage activity (20-50 minutes)

Show the students the quote from Katie from the Science team ([resource 1 – slide 11](#)) and read it as a class.

[\(resource 1 – slide 12\)](#) It's very important that Eden is able to communicate scientific information about its work to the visitors in a way that they can easily understand. Ask the students to create a sign to go into the biome that explains the need to control pests in the biome, how we control pests in the biome and the difference between biocontrol and pesticides. The cards from the card sort will be helpful for them to refer to.

LESSON PLAN

CREATED FOR TEACHERS BY EDEN'S EDUCATION TEAM

Show them the example of signs that we already have in the biome (**resource 1 – slide 13**). Highlight the use of the Widgit Literacy Symbols (WLS) on both of the signs. We use this symbol language to help make the information accessible for everyone. Ask the students to use this on their sign to get some simple messages across. (You can find out more here: <http://www.widgit.com/symbols/index.htm>)

Before they begin as a class ask them to decide on the success criteria for an effective sign for the biome. Get them to write each of their ideas on a post-it and stick them on the board. Select post-its and use them to highlight characteristics of a good sign. For example, the sign must be clearly written and to the point, it must be able to be read in under 30 seconds, it might include a simple picture, the information must be accessible for everyone (use WLS), it needs to explain three key pieces of information. Leave the post-its displayed on the edge of the board for the students to refer to.

Note: there isn't time to produce a perfectly finished sign in this lesson. Students should think of this as a draft version so it does not need to be as neat or beautiful at this stage. However, it must contain all the text, diagrams, WLS that they want to use and it must have a clear layout.

Finally: peer assessment of signage (50-60 minutes)

Ask each group to swap their sign with a neighbouring group. Get them to assess the sign against the agreed success criteria on the board. Remind them what the success criteria are before they begin.

Ask them to write 2 stars and a wish on the sign to explain clearly what was good about the sign and how it could be improved. Hand the signs back for the students to reflect upon. Potentially they could use this feedback to make some changes and then create the final sign in another lesson, making cross curricular links with Art, Design, Graphics and English.

Review the lesson aims (**resource 1 – slide 14**).

Point the students in the direction of some useful websites linked to themes raised in the series of lesson. (**resource 1 – slide 15 & 16**).