

Sustainable palm oil

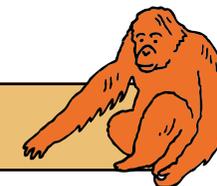
Conservation

Term: Autumn/ Spring/ Summer

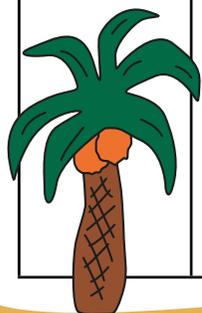
Subject: Science

To understand how reproduction occurs for
Topic: amphibians and most insects.

Year: 5



	National Curriculum Links	Overview	Assessment / Questions	Resources
LESSON	<p>Science Living things and their habitats</p> <ul style="list-style-type: none"> Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. <p>Pupils should be taught to describe the life process of reproduction in some plants and animals.</p> <p>Working Scientifically - Pupils might work scientifically by observing and comparing the life cycles of animals in their local environment with other animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences.</p> <p>Learning Objective(s) To understand how reproduction occurs for amphibians and most insects.</p> <p>Success Criteria I can:</p> <ul style="list-style-type: none"> Describe how some amphibians reproduce. Describe how some insects reproduce. Explain how metamorphosis differs between these two groups. Explain how most amphibian and insect reproduction is sexual reproduction. Compare similarities and differences between a rainforest animal and a UK animal. 	<p>Prior learning In year 4, the children should have covered work to recognise that living things can be grouped in a variety of ways.</p> <p>In year 4, the children should have explored classification keys to help them group, identify and name a variety of living things in their local and wider environment.</p> <p>The children may have undertaken a KS2 KWL (Know, Want Learn) impact activity sheet in which they would have discussed or recorded what they already knew about life cycles and reproduction within plants and animals.</p> <p>See lesson plan: 'Y5 Sci Lesson1 Comparing and contrasting life cycles.' The children will have undertaken activities to compare specific animals within specific groups and between groups. They will have compared and contrasted the general life cycles of each of these groups.</p> <p>The children may have been given work to describe the life process of reproduction in some plants and may have looked at life cycles of plants prior to this lesson. Both could also be taught after this lesson.</p> <p>Introduction N.B. It may be necessary to show some of the slides (slides 10 to 14), relating to sexual reproduction in different animals in a separate lesson, prior to carrying out the activities, due to time constraints. It is likely that the activities will take place in more than one session.</p> <p>The PowerPoint: 'Reproduction for Amphibians and most insects' will be used to guide this lesson.</p> <p>See slide 2. Ask the children: <i>'What animal group life cycles have you been learning about?'</i></p> <p>Click on the PowerPoint slide to reveal the answer. Hopefully, the children will remember that they have been learning about the life cycles of mammals, amphibians,</p>	<ul style="list-style-type: none"> What animal group life cycles have you been learning about? To which animal groups do frogs and butterflies belong? Can you explain how the life cycles are similar? Can you explain how the life cycles are different? Can you explain one way in which an amphibian reproduces differently from an insect? What is similar about the reproduction of insects and amphibians? Can you explain the process of metamorphosis in an insect?/ specific insect? What is the difference between metamorphosis in an insect and in an amphibian? Can you explain the process of metamorphosis in an amphibian?/ specific amphibian? How does the insect/ amphibian you studied adapted to its environment during the process of reproduction? Can you explain how a specific insect/ amphibian you studied from the rainforest differs from one in the UK? 	<ul style="list-style-type: none"> PowerPoint: Reproduction in Animals. Sorting the life cycle of a frog and a butterfly. Chester Zoo Life Cycle Posters. Amphibian Life Cycle Incomplete Metamorphosis Insect Life Cycle Complete Metamorphosis Insect Life Cycle Comparing the repro of an insect and an amphibian WORKSHEET. Paper, pens, pencils and coloured pencils. Secondary resources e.g. books and the internet related to amphibians and insects (from the UK and in the rainforest of Borneo or Sumatra). These two websites show how sensible replanting of oil palm can improve the loss of diversity encountered by replanting new oil palm plantations: https://news.mongabay.com/2016/07/replanting-oil-palm-plantations-reduces-frog-diversity-but-researchers-say-there-are-ways-to-fix-that/ Gates Cambridge: Replanting reduces



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insects and birds.

See slide 3. Introduce the learning objective and success criteria.

See slide 4. Ask the children:

'To which animal groups do frogs and butterflies belong?'

Hopefully, the children will realise that frogs are amphibians and butterflies are insects with complete metamorphosis (i.e. the change of form is complete). Click on the screen to reveal the answer.

See slide 5. Introduce the worksheet: 'Sorting the life cycle of a frog and a butterfly.' The children should be asked to sort the pictures shown on the worksheet into the separate life cycles of a frog and a butterfly. They should draw arrows between the pictures, similar to those on the 'Life Cycle Posters' introduced in the lesson on life cycles. (If necessary, show one of these, but not the amphibian or complete metamorphosis of an insect life cycles). The children should annotate the life cycles with relevant information that they can remember, relating to the life cycles of these animal groups. These diagrams will act as concept maps, demonstrating the children's understanding of amphibians and insects so far.

See slide 6. After the children have created their life cycles, allow them to view the amphibian life cycle and the insect life cycle posters, possibly in pairs. Using another colour, they should correct (amend) the labels and annotations, if necessary. Review the life cycles together, using slides 7 and 8 and allow the children to further amend their work further. Ask the children:

'Can you explain how the life cycles are similar?'

'Can you explain how the life cycles are different?'

Encourage the children to understand how both animals undergo metamorphosis i.e. they both can change their form completely. Explain that for an insect showing incomplete metamorphosis, its form, when it hatches, resembles that of the adult.

Show the children the slides related to reproduction...

Show slide 9. Explain that almost all animals use sexual reproduction to produce their offspring. Sexual reproduction requires male and female cells from two parents combining to form one cell, in a process called fertilisation. Show the

frog diversity in oil palm
www.gatescambridge.org/about/news/replanting-reduces-frog-diversity-in-oil-palm/

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image on the slide with the picture of a (CZ to insert name of animal) and its male and female parents). The offspring generally look similar to their parents.

Show slide 10. Depending on the animal species, fertilisation can happen outside (externally) or inside the body (internally). Show the picture of animals born from internal fertilisation and from external fertilisation. (CZ to insert picture on the slide of an animal produced from internal and external fertilisation (e.g. orangutan and frog?).

Show slide 11. External fertilisation occurs for many animals that live in water. For most species of fish, sperm and eggs are released into the water and some fertilise. Huge numbers are released since sperm and egg are vulnerable and may be eaten by predators or die from harsh environmental conditions, such as temperature. Refer to the picture on the slide to illustrate your point.

Show slide 12. Internal fertilisation occurs for most animals that live on land and for some aquatic animals. It provides protection from the surrounding environment and from predators; offspring are more likely to survive and fewer offspring are produced. Show the picture on the slide to illustrate your point.

Show slide 13 that discusses the three forms of internal fertilisation.

Following internal fertilisation of the egg in the female:

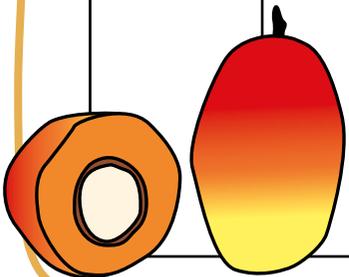
The offspring develop in the female body and then the young are born alive. (Most mammals e.g. humans, some reptiles and a few fish.

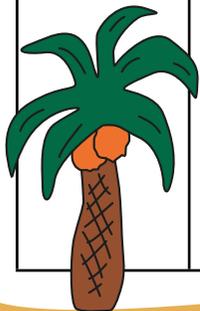
The egg is laid outside the female body and the offspring develop in the egg until they are ready to hatch. (Birds).

The offspring develop inside the female body, the eggs hatch as they are laid, looking like live birth. (Some fish, some reptiles and some invertebrates).

Show slide of 14. Explain to the children that most insects produce eggs through sexual reproduction, although there are a few animals that reproduce asexually (without the need for two parents) and these are identical to the parent, clones e.g. aphids.

Show slide 15. Explain that during this session, the children will be focusing on reproduction, specifically the reproduction found in insects and amphibians. They will be comparing and contrasting these animal groups.





Remind the children that most amphibians and insects are fertilised through sexual reproduction.

See slide 16. Introduce the activities in turn. Model how to undertake the activities.

Activities

For all groups, the children will be given questions on the worksheet: 'Comparing the reproduction of an insect and an amphibian' (file name: Comparing the repro of an insect and an amphibian) that focus on the reproduction of both animals, their reproduction similarities and differences. *The children should use the 'Chester Zoo Life Cycle Posters' of amphibians and insects (with complete metamorphosis) to help them. They could use a frog and a butterfly as examples in their answers. (CZ to insert suitable images/ graphics).

Show slide 17.

**The children should use the relevant 'Chester Zoo Life Cycle Posters' but also should use secondary resources (e.g. books, the internet) to find out specific information related to a specific amphibian and specific insect. At least one of the animals should be an insect or amphibian found in the rainforest of Borneo or Sumatra.

Show slide 18.

***See **The children should also compare the animal they researched that lives in the rainforest (insect or amphibian) with an animal in the same group in the UK:

- Do specific details related to reproduction differ?
- How are the conditions different for survival?
- The children should discuss these to feed back information to the class.

N.B. The information on slides 16, 17 and 18 could be printed out for the different groups of children, to remind them of the activity they should undertake.

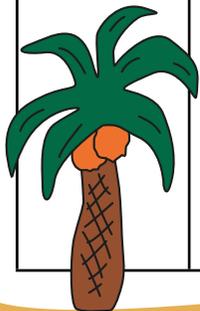
Plenary

Show slide 19. Review examples of the work achieved by the children.

Review the learning objective and success criteria. Also, ask differentiated questions to review understanding:

'Can you explain one way in which an amphibian reproduces differently from an insect?'

'What is similar about the reproduction of insects and amphibians?'



'Can you explain the process of metamorphosis in an insect?/ specific insect?'

'What is the difference between metamorphosis in an insect and in an amphibian?'

'Can you explain the process of metamorphosis in an amphibian?/ specific amphibian?'

'How does the insect/ amphibian you studied adapted to its environment during the process of reproduction?'

'Can you explain how a specific insect/ amphibian you studied from the rainforest differs from one in the UK?'

Show slides 20 to 22:
(CZ to check and upgrade this information below in red, if necessary. N.B. This is also included in the notes on slide 20 to 22).

Explain that oil palm plantations have led to a decrease in insects and amphibians. However, emphasise how oil palm produces more oil per land area than any other crop and so planting of other crops, other than palm oil would cause a greater loss of rainforest and diversity. Therefore, it is important that palm oil continues to be produced, but in a more sustainable way. (If time allows, refer to the information shown on the final slide).

The introduction of wildlife corridors supports rainforest diversity by providing pathways to the rainforest areas. Amphibian and insect diversity have been seen to decrease with the planting of oil palm plantations. Other sustainable methods are being investigated. Recently researchers say that practices such as staggered replanting of palm oil (instead of replanting oil palm all at once) and maintaining connectivity between mature (older) oil palm could help to increase diversity. Ensuring older oil palm patches stay connected, allows e.g. frogs to move between them.

Possible ongoing work

See follow up to the lesson 'Comparing and contrasting the life cycle of mammals, amphibians, insects and birds' in which the children compare animals within the same group e.g. mammals.

The children could also find out about how some insects can reproduce asexually e.g. stick insects. The children can draw pictures of these animals and give a brief explanation of asexual reproduction.

The children can compare and contrast the life cycle of mammals and birds. They could look at specific animals endangered by unsustainable palm oil plantations (i.e. through deforestation of the rainforest) e.g. the orangutan or the Malayan sun bear). They could compare how they reproduce using Venn diagrams or tables. The children could research the impact of unsustainable palm oil plantations on the mammals.

Emphasise how biodiversity can be increased in the rainforest by preserving as much of the remaining natural forest as possible e.g. by creating forested buffer zones around the oil palm estates or protecting remnant forest patches in the landscape (wildlife corridors). These are sustainable methods used for sustainable oil palm plantations.

The children could observe changes in animals over a period of time (e.g. by hatching and rearing chicks).

Research and compare the similarities and differences of a human skeleton to that of the endangered orangutan.

The children should compare and contrast the life cycle of plants. (See also 'Prior learning'). They would need to compare and contrast example life cycles in their local environment and should also compare local plants with plants found in the rainforests of Borneo (or Sumatra). Teachers should focus on how plants in Borneo and Sumatra are affected by deforestation from unsustainable palm oil production.

It is likely that the lessons on plant life cycles will involve long term projects involving e.g. planting the seeds of plants in the vegetable garden or a flower border and observing the plant changes over a period of time.

The children should also be given lessons to find out about sexual and asexual reproduction in plants. (See also 'Prior learning'). The children might try to grow new plants from different parts of the parent plant e.g. seeds, stem and root cuttings, tubers and bulbs and could observe the life cycle of these plants over a period of time.

