

Learning Intentions

For students to:

- Analyse evidence and draw and justify conclusions
- Work effectively in a group
- Use new vocabulary such as aquatic plants, over-fishing, predators, bio-mass and invasive species
- Use an atlas

Context:

- Case study about invasive plant species and water
- Statement cards

Resources

Provided

- Case study – invasive species plus map to show location of Akosombo Dam
- Image of water hyacinths on lake
- Student worksheet - where have the fish gone?

Needed

- Atlases
- Computer—depending on the detail of the atlases, this may not be needed

Links to National Curriculum subjects

Geography KS2

Enquiry and skills (1a, 1c, 1e, 2a, 2c)
 Knowledge and understanding of places (3c, 3d, 3e)
 Patterns and processes (4b)
 Environmental change and sustainable development (5a, 5b)
 Breadth of study (6c, 6e)

Geography KS3

Enquiry and skills (1a, 1c, 1f, 2a, 2c)
 Knowledge and understanding of places (3a, 3c, 3d,)
 Patterns and processes (4b)
 Environmental change and sustainable development (5a, 5b)
 Breadth of study (6d, 6e, 6h, 6i, 6j, 6k)

3. Where have the fish gone?

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Overview

'Where have the fish gone?' is a mystery activity. Students are given a series of cards containing information. Working in small groups, they are asked to sort out and use the information to make a story. From this, students are asked to come up with an explanation as to why there are no fish in the Akosombo Dam. Sorting cards allows pupils to handle materials and for some pupils this is a useful way of introducing longer writing.

Teaching activity

- 1 Photocopy the cards and provide a set to each group of students (in threes or fours).
- 2 Ask the students to sort out the cards and come up with a story to explain where the fish have gone. Students can be encouraged to explore different ways of working with these materials. For example:
 - Reading and then spreading the cards out on a table. This allows everyone in a group to know the 'facts'.
 - Work out those points which are not relevant to the main question and have a reject pile, or separate these into a different section on the table.
 - Link up points in a sequence to tell a story.
 - Put the cards onto a large sheet of paper and draw links between cards. Extra notes or ideas can also be made on the sheet of paper to help with discussion.

The idea behind this activity is that students begin to think about an event for which there is no clear explanation. Some of the information on the cards is extra to solving the 'mystery'. Mysteries work on the basis that there are lots of possible answers. This activity is sufficiently open-ended to allow more able students to come up with a range of ideas for the absence of fish.

- 3 Show the students the photograph of the water hyacinths on the Dam. This should answer some of their questions and help them understand that there are stories behind a simple picture. It's important to remember that this mystery has no definite answer: the photograph gives only one aspect of the problem. Poverty over-fishing, disease and predators will also be possible factors.
- 4 Ask the students to find out where the Akosombo Dam is located. If they are only using atlases, you may need to tell them that the Dam is in Ghana.
- 5 If time permits, you can use the cards as a simple framework for extended writing.

Assessment

Pupil worksheets assessed for levels of response

- No recognition of role of climate change on fishing
- Some recognition of role of climate change on fishing
- Notice made of small details and an awareness of the role of climate change in the growth of invasive species and its effect on fish
- Awareness of the role of a responsible citizen to alter the factors which are causing the change in plant life and aquatics.

Visits to botanic gardens

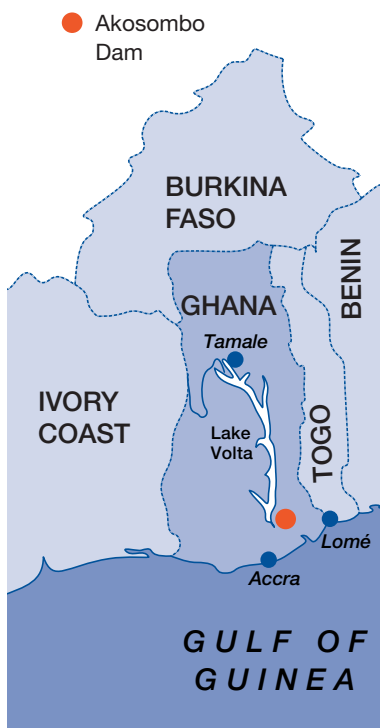
This activity is suited to either a school grounds or a botanic garden as it relies on knowledge of aquatic plants. Botanic gardens may have water hyacinth or similar species to show pupils.

Case study - Invasive species

The water hyacinth (*Eichhornia crassipes*) originates from the Amazon but now threatens native biodiversity globally. Its growth rate is among the highest of any plant known; the species is able to double its mass in 12 days and can grow faster than it can be cleared. These species form dense mats that cover thousands of hectares, preventing sunlight and water from getting into the water and choking out other species. This results in a loss of livelihood (fishing), decrease in available water and even a threat to power generation. The Akosombo Dam in Ghana is under serious threat from the water hyacinth.

The water fern *Azolla* spp. is an invasive plant species, widely introduced globally via ship's ballasts, for example in the Caspian sea (Global Invasive Species Database, 2005). The species provides a haven for mosquito larvae in Africa.

Acacia nilotica has been declared a weed of national significance in Australia. Though introduced to provide shade for sheep it causes significant damage to cattle production by reducing pasture production. In terms of the environment, the species increases soil erosion and water loss through transpiration. *A. nilotica* has vast potential distribution and actively expands its range. Climate change will likely increase areas at risk of invasion (Kriticos *et al.*, 2003).



Where have the fish gone from the Akosombo Dam?

The water hyacinth comes from the Amazon but can grow in lots of places.

The water hyacinth grows on the surface of calm water in places such as dams and lakes.

Many plants such as the water fern grow on the surface of lakes.

Dams are used to stop flooding and hold back water to use when there is a drought.

Places far away from the sea can have fish in their lakes and people catch these to make money.

Fish are farmed in many lakes and provide valuable protein for local people's diet.

Fish need oxygen in the water, sunlight and nutrients to live and grow.

Plants need water, nutrients, sunlight and carbon dioxide to grow.

Some plants take years to spread out over an area.

Water hyacinth can spread out over twice the area it started from in 12 days.

Lakes and dams can be used to make electricity.

The Akosombo Dam has water hyacinth growing on the lake behind the dam.

Water hyacinth forms thick mats of stems and leaves that cover thousands of hectares of water, stopping sunlight and water from getting into the water and choking out other types of plants.

People living near the Akosombo Dam are very poor and would like to have a better income.

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- Look at the information on the cards
- Sort the information out to see if you can create a story
- Which cards are useful to tell a story?
- Are there some cards that need more information? Ask your teacher to help you.
- What do you think has happened here? Why are there no fish? Can you come up with a good reasoned explanation?
- Where is the Akosombo Dam? Use an atlas to find the Dam and draw a map to show its location.
- Why do you think people who live near the Akosombo Dam are poor?

This activity is called a mystery and as in all mysteries we are not always sure about the answer.

