



FLOOD ALERT

Teacher's guide



practicalaction.org/schools/flood-alert

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Secondary Upd8s provide relevant contexts and creative hooks for your science lessons.

Heavy monsoon rains can devastate communities in Nepal. Severe flooding leaves families destitute with homes, stored food, cultivated land and livestock destroyed. Lives are frequently lost. But now, with advanced warning systems in place in some areas, communities are able to prepare themselves and lives are being saved.

As a starting point students consider the implications of flooding both here and in Nepal. In the main part of the lesson they devise their own flood warning device and create a technical brief for an international audience using recognised circuit symbols. Finally students consider how best people both here and in Nepal can prepare for floods.

This lesson makes an ideal KS2–KS3 transition activity. The design activity may be pitched appropriately to the age and experience of the students either by the task set (a simple or parallel circuit) or by the level of guidance given.

Learning objectives

In this lesson pupils will:

- use their understanding of conductors and simple circuits to design a flood alarm circuit (KS2).
- use their understanding of series and parallel circuits to create a combined warning and alarm circuit (KS3).
- use circuit symbols to create a technical brief for their design.

Curriculum links

England National Curriculum KS2:

- Upper KS2 Electricity: Use recognised symbols when representing a simple circuit in a diagram.
- Working Scientifically: Designing and making a useful circuit

England National Curriculum KS3 Physics:

- Electricity and Magnetism: Current Electricity, electricity in series and parallel circuits

Resources

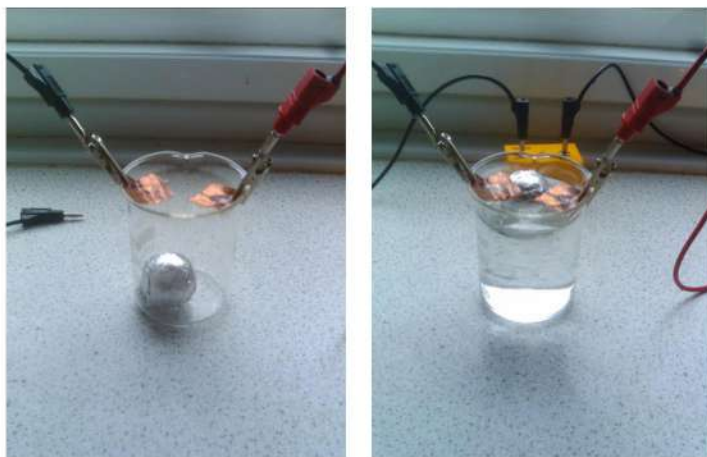
Pupil activity sheet (one per group)

Flood alarm: Technical brief (PPT slide 6)

Equipment (per group)

- 2 1.5 V cells
- Leads/crocodile clips
- Bulb (and buzzer if students building parallel circuit)
- 1 or 2 250 cm³ beakers or other containers for water
- 2 copper strips (approximately 1 cm × 5 cm)
- Aluminium foil
- Floating object (e.g. a table tennis ball or cork)
- Plastic pipe of sufficient diameter to fit the floating object
- Larger beaker/jug to pour water and gradually change the water level

The photos below show a simple set up for a water level alarm. A table tennis ball is wrapped in foil. As it rises it makes contact with the two copper strips, completes the circuit and either makes a light bulb glow or a buzzer buzz. Two such water level devices may be connected in parallel and set to connect at different water levels thereby providing a warning followed by the actual alarm. A plastic tube could be used to confine the table tennis ball so as to ensure it rises in the right direction to connect the circuit.



Starter activity

Choose a suitable location for a flood warning station (15 min)

Display **PowerPoint (PPT) slide 3** and remind students of flooding in the UK. Use: apps.environment-agency.gov.uk/river-and-sea-levels to look at river levels in your area. Discuss how information like this may be used in times of heavy rain to predict flooding. Is it helpful to know the river level

in your immediate area or is it more important to have data about river levels further upstream?

Display **PPT slides 4 and 5** to show the consequences to a community in Nepal of flooding with no advanced warning. Ask pupils to discuss in pairs what difference a flood warning system might make. Elicit that a warning system might allow time for people to move themselves, and their possessions, to higher ground, thus avoiding damage (and even death).

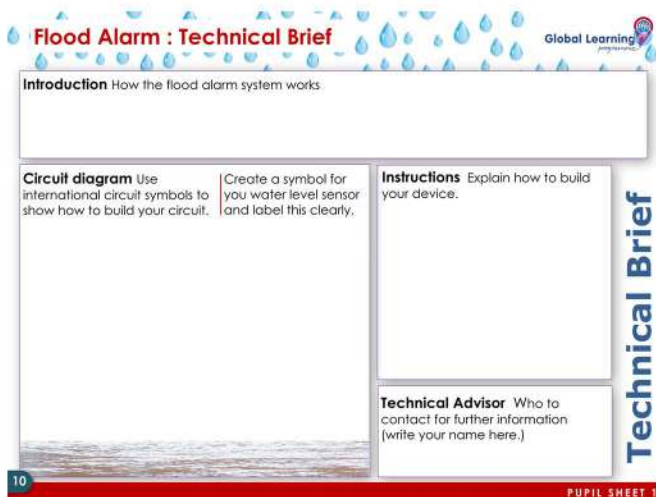
Use Googlemaps to provide an aerial view of the region (search term Chisapani 21800 Nepal- to ensure the correct Chisapani) that corresponds to **PPT slide 6**. Tell pupils that the Karnali river flows south. Pupils then use the outline river map on **PPT slide 6** to identify which of the listed settlements would be the best location for a flood warning station. The answer is Chisapani, since it is upstream of the other settlements.

Core task

Design and make a flood warning system. Create a technical brief (30 min)

Display **PPT slide 7**. Pupils use the equipment to devise a water level sensor using their understanding of conductors and the need for a complete circuit. Pupils build a circuit that will make an audible alarm sound (buzzer) when a defined danger level of water is reached.

KS3 students could be challenged to devise a circuit containing two sensors. The first sensor should switch on a warning light when the water reaches a defined 'warning level'. The audible alarm should sound later, when the water reaches 'danger level'. To achieve this, students will need to construct a parallel circuit.



Using the technical brief examples from www.practicalaction.org/schools/technical-briefs-construction/

pupil should design their own technical brief using the activity sheet *Flood alert: Technical brief*. Diagrams should be drawn with standard circuit symbols.

Discuss limitations of the devices with pupils. One of these is that the monitoring system would require a staffed monitoring station.

Plenary

Reflect upon the impact of the flood warning system in Nepal (10 min)

Display **PPT slide 9**, and ask pupil pairs to briefly discuss how else people in Nepal could be prepared for floods. They could research flood warning systems on the internet.

Show pupils the video, Preparing for floods in Nepal www.youtu.be/cqOI5uikghc then discuss.

Extension ideas

For homework, students could create their own flood emergency plan advice using www.gov.uk/prepare-for-flooding/future-flooding

Health and Safety

Please refer to the ASE's Be Safe publication for advice on risk assessments in science.

Acknowledgments

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