MONSOON PROOF ROOF

Teacher's guide

practicalaction.org/schools/monsoon-proof-roof

Practical ACTION

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

Practical Action works with communities in Bangladesh to build flood-proof homes. Severe flooding, which is likely to continue to get worse due to climate change, has severely damaged people's homes and degraded their land.

Communities work together to build raised plinths on which to construct their newly designed homes. Wells have also been raised to avoid contamination.

New homes have jute panels for the walls which are cheap to produce and can be easily replaced if damaged by flood water. They are held in place by treated bamboo poles.

This activity focuses on the final part of the house, the roof. Children will investigate whether a local material, straw, is the best material to use or if a different material would be better.

Children will be able to work scientifically by:
- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.

Children will learn:
- To give reasons, based on fair tests, for the particular uses of everyday materials, including metals, wood and plastic.

Resources

Equipment (for each group)
- Materials to test e.g. foil from a turkey roasting tin (as a substitute for corrugated iron), plastic as well as 'natural' materials such as wood
- Scissors
- Rulers
- Small watering can with a rose
- Volume measuring equipment
- Masses
- Stop clock
- Tray to catch water or access to outdoor area

Introducing the activity

Ideas for discussion starters:

- What material are roofs in new buildings in your area made from?
- What materials are the roofs in older buildings made from?
- Is there any link with what is locally available? (e.g. stone, slate, clay tiles…)
- Why do modern buildings use materials bought in from elsewhere?
- Why might a family change from using traditional materials for their roof to newer materials?

Use the discussion to make connections with the global issue. When selecting building materials, people must balance the suitability of a material's properties for local conditions with availability and cost of that material. For example they may choose a locally available raw material or the material may be sourced or manufactured elsewhere and need to be purchased at greater expense.

Show **PowerPoint (PPT) slides 1 and 2** to introduce the problem.

PPT Slide 1 introduces Mehrab, a 9 year old boy, who lives in Bangladesh. His family is rebuilding their home on a raised area of ground to protect it from flooding.

PPT Slide 2 introduces the big question.

BIG QUESTION: What materials should Mehrab suggest his parents use for the roof of their new home?

Use **PPT slide 3** and other images of homes around the world to encourage discussion about why different materials are chosen for roofs. Support children to distinguish reasons to do with cost and availability, from scientific reasons based on the properties of the materials. In Mehrab's village the traditional thatched roofs were made from natural resources that people could gather for free.

Ideas could include:

- Log cabin. The roof material should help keep heat in the home, it needs to be strong to support a heavy weight of snow and waterproof when the snow melts.
- Conservatory. The roof material needs to let in the sunlight but waterproof to keep out the rain.

The children should then decide what properties are important for Mehrab's family using the weather information for Bangladesh on **PPT slide 4** and their own research.

The children should notice that Bangladesh has particularly high rainfall for part of the year (the monsoon season). This means that roofs need to be waterproof and also strong due to the heavy rain.

Discuss what other properties would be helpful in making a good roof. During a monsoon the wind speed increases so roofs have to also be able to withstand strong winds. The temperatures are very hot so homes will get very hot inside. Falling rain could make a lot of noise on some types of roof.

The children should then plan and carry out one investigation to find out which material is best in terms of one particular property. Encourage each group to investigate a different property. This investigation provides a good opportunity to use data logging equipment.

Support the children in using their combined evidence to suggest and justify an answer to the Big Question. It is important to emphasize that there is not a 'right answer'. The important thing is that the children can give good reasons. To do this they will need to consider which properties are a priority for the roof to have and which properties may be desirable but not essential.

Discuss with the children the global issue that people cannot always use the best material for the purpose. Often people use traditional, locally available materials because they are cheaper.

Show **PPT Slide 5**: What happened next? Mehrab's family roofed their new house with corrugated iron. This is more waterproof than the straw and is relatively cheap to buy and readily available in Bangladesh. Mehrab's home is now drier when it rains (although the roof is quite noisy!). The raised platform and other design features make his family feel much safer from flooding. For Mehrab's family, keeping out the rain was much more important than whether or not the roof was noisy.

Evidence of children's thinking and learning:

- The variables that the children identify and control during the investigation.
- The comments the children make when discussing their results and drawing conclusions.

Extension ideas

D and T
Create a model of a building with a roof of the chosen material – see Practical Action's Beat the Flood. Investigate different shapes of roofs and how they are able to withstand strong winds.
practicalaction.org/schools/beat-the-flood

Maths
This activity allows children to practice drawing graphs and is a good opportunity to provid differentiation in terms of the type of data collected. For example, an investigation into how waterproof a material is will produce a bar graph whereas an investigation into how the temperature inside a house varies with the material could produce a line graph.

Science at your fingertips

All materials have specific properties. Materials are chosen so that the properties of the material suit the purpose it has been chosen for. If a variety of properties are needed (e.g. strength and being waterproof) then a compromise may be needed.

Health and Safety

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

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