

## BURNING BALLOONS

### Objectives

To demonstrate how water temperature and volume are related by heating a balloon containing no water and a one half filled with water.

### Duration

30 minutes

### Group Size

20-30 students

### Materials

- A box of matches
- 2 balloons
- 1 empty
- 1 filled with 3 cups water and tied
- A bucket
- A towel

### Background

When a balloon is full with air, the match will burn a hole through the balloon causing it to pop. When the balloon is half filled with water it will singe but should not burst. This is because the water is dispersed over the area of the bottom of the balloon preventing the heat to be confined to one spot and therefore not allowing the balloon to burst.

#### Water Temperature and Volume

When water is heated, the heat disperses or spreads out within the water body as water molecules move

around rapidly. Therefore, the heat is not contained to one area.

The less water there is, the more easily it is heated. The more water there is the less easily it is heated. Heat spreads out or 'disperses' across water. If there is a small amount or 'volume' of water the heat doesn't need to spread as far and therefore the water gets hotter. If there is a larger volume of water the heat has further to spread and therefore can't heat the water as much.

For example, in a wetland the temperature of the water increases (gets hotter) as the wetland dries up and loses volume.

#### Water Temperature and Density

Water temperature and density are also related. When water is cooler, water molecules don't move around as much and become heavier or more 'dense'. This means that because cooler water is denser it settles to the bottom of the water body while the warm water sits on top.

For example, in a dam the temperature of the water is much cooler at the bottom than the top.

## LESSON PLAN

### Introduction (2 minutes)

Explain the information in 'background' about water temperature and volume including the example of a wetland.

### Setting the Scene (3 minutes)

Explain to the students that you will be using two balloons for this demonstration, one empty and one with half filled with water (show the balloons). Ask

them what they think might happen to each of the balloons when you hold a match to them.

### Activity (20 minutes)

1. Blow up a balloon or let a student do this and tie it off.
2. Now introduce the box of matches.
3. Ask the students to yell out "Stop" when they think the match is going to burn the balloon.
4. Light the match and move it slowly closer to the balloon.
5. Make the balloon pop by putting the match closer (can repeat a couple of times)
6. Ask students why they think the balloon popped.
7. Introduce the balloon with a large amount of water in it.
8. Choose two participants from the class to come out the front.
9. Ask one of the students to sit in a chair at the front of the group.
10. Get the towel and wrap it around the student sitting in the chair. Play it up, so they all think the student is going to get wet.
11. Ask the other participant to hold the top of the balloon over the students head.
12. Light the match and once again move it closer to the balloon.
13. If the match goes out keeping trying to burn the balloon, eventually you will have a charred spot on the balloon.

14. Stop burning the balloon once it is charred.
15. Show the students the bottom of the balloon where they can see the charred spot where the match burnt.
16. Ask the students this time why they think the balloon didn't burst.
17. Explain that the balloon didn't burst this time because there was a large volume of water in the balloon and the heat was dispersed, meaning it could reach a combustible temperature in on particular spot.

### Conclusion (5 minutes)

- Explain again, or ask one of the students to try and explain, dispersion and the relationship between temperature and volume.

### More information

Contact Sandy Dellwo, Land Services Officer – Education on 03 5880 1415.

### Acknowledgments

This activity has been adapted from an activity provided by the Riverina Environmental Education Centre. For more information visit:

[www.reec.nsw.edu.au](http://www.reec.nsw.edu.au)

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