

MODELLING CLIMATE CHANGE: MODELLING POSITIVE FEEDBACKS

As greenhouse gases increase in our atmosphere we are observing a warming effect. This in turn increases the amount of atmospheric water vapour. Water vapour absorbs infrared radiation and produces a further warming effect. This is one example of a *positive feedback*.

In this activity your teacher will use a 'leaky' bottle with water to demonstrate positive feedback.

1. Your teacher will set up a 'leaky bottle' to model the energy transfers between the Sun, the Earth and space.
2. What represents the flow of energy from the Sun? What represents energy emitted by the Earth? What represents the temperature of the Earth?
3. What happens to the level of the water in the bottle if the rate of water flowing into or out of the bottle is changed?
4. The system is left until it achieves a balance, with the rate of water flowing in equal to that flowing out. The stand that the bottle is resting on is now turned round so that the weight of the bottle presses down on the outflow tube.
5. What happens to the water level in the bottle? Can you explain why this happens? Will this system reach a balance with the rate of water flowing in equal to that flowing out?

In the first experiment, a balance is achieved because of *negative feedback*. In the second experiment, a 'run-away' situation is created because of *positive feedback*.

6. Use your observations of the model to explain how melting snow and sea-ice can lead to positive feedback.
7. In a similar way, explain how increases in water vapour in the atmosphere can lead to positive feedback.
8. What could happen to the Earth's temperature as the amounts of greenhouse gases in the atmosphere increase and positive feedbacks come into play?

