CHATSWORTH

CELEBRATING THE CASCADE

Cascade Learning

Flowing through your curriculum

Chatsworth Got Flow!

Film Guide for Secondary School Teachers

THE NATIONAL LOTTERY HERITAGE FUND

Learning and Engagement resources have been designed for the Celebrating the Cascade project, made possible by The National Lottery Heritage Fund. Thanks to National Lottery Players the project is working to restore the Cascade, safeguarding it for the enjoyment of future generations and enabling more people to get involved with Chatsworth.

The Learning and Engagement team engage audiences with the learning and wellbeing possibilities associated with the Chatsworth water artery.

Made possible with

Heritage Fund

Cascade Learning
Flowing through your curriculum

INTRODUCTION

CHATWORTH GOT FLOW - FILM

Design - The Cascade Learning Show has been designed for the Celebrating the Cascade project at Chatsworth House.

Collaboration – curriculum themes relating to the Cascade and water artery were explored with teachers from Netherthorpe School, Staveley, Derbyshire.

Coproduction - Jon Chase, science communicator and rapper, was commissioned to produce and perform the show.

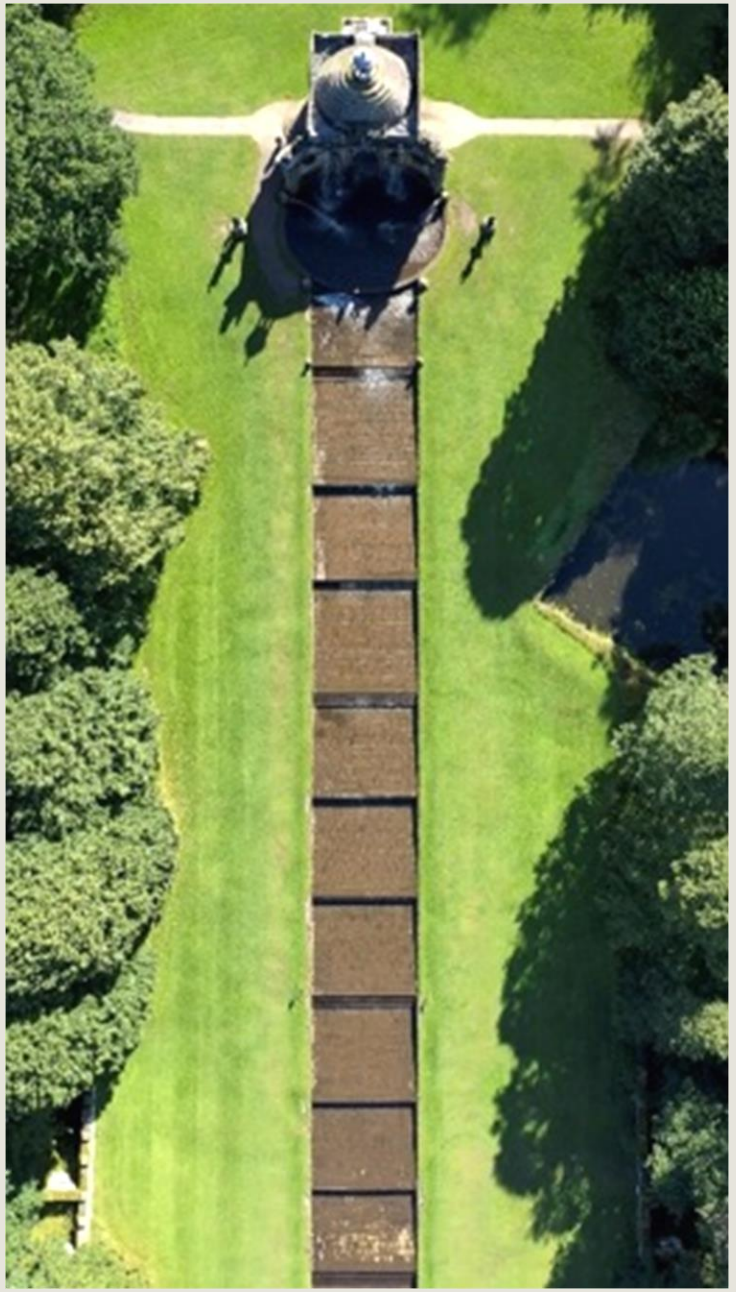
Performance – the pilot show performance in October 2024 for Year 9 pupils was filmed by Paradigm Arts.

Inspiration – key concepts, skills and equations relating to the water cycle, gravity, pressure, engineering, design and hydro-electricity use the *real-life* case study example of the Chatsworth Water Artery.

Chatsworth Got Flow!

USING THIS FILM GUIDE

1. The Cascade Learning Show is divided into 3 sections, each with a different curriculum focus.
2. Each section has a rap verse and summary points.
3. Film times are provided for each section.
4. Case study projects and visits can be linked to this show.
5. Use the film as a real-life case study resource to engage learners with the themes and site.
6. Use the demonstrations as inspiration for experiments and challenges. These can also feature in sessions at Chatsworth.
7. Use the rap as an engagement tool to inspire learning and creativity.

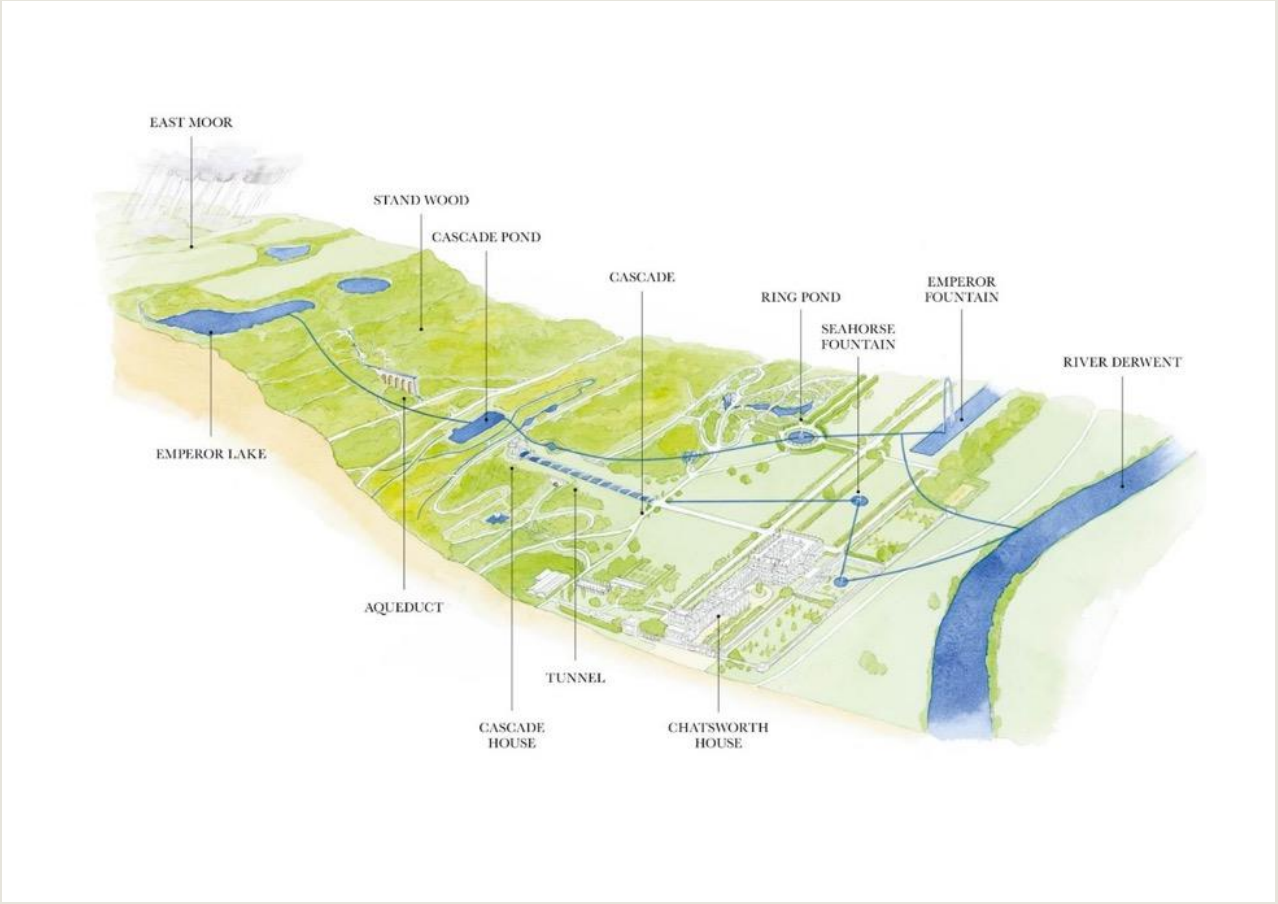


Chatsworth Got Flow

Chatsworth Got Flow!
Rap chorus

The cascade! Got a whole lot of flow,
Yo, we're getting down with the H2O,
From the Moors to the Artery then,
D-D-Down to the Derwent, where it ends,

Chatsworth! Got a whole lot of flow,
Yo, we're getting down with the H2O,
From the flow of ideas or energy there's,
a fountain of fascinating things to know!



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Flow of Water

Flow of Water	Film Time
Introduction	1:17
Summary	14:04
Rap	15:08

Focus

Curriculum - geography, science, engineering and mathematics.

Concepts, themes & skills – water cycle; evaporation; condensation; water flow and use; gravity fed water works; sustainability; climate; weather; electricity; relationships between the natural and built environments; impact of people upon the landscape.

Summary

- The hydrologic cycle is a natural process that brings us water.
- The landscape affects where the rain falls, how water flows and where it collects.
- Human activity at Chatsworth relies on the effective functioning of the hydrologic cycle.
- Understanding nature can provide us with clever solutions for achieving our everyday needs.

Flow of Water

Chatsworth Got Flow!

Flow of Water Rap Verse

When the Sun rays hit the H2O,
It rises and forms into clouds that blow,
Over the hills and the Eastern Moors,
that capture the water when the rain falls,

It soaks into moss and feeds into streams,
and some of them were built by us human beings,
as gravity brings the force pulling everything down,
so the water always heads for the lowest ground,

That's why it settles in the ponds and lakes
and how we control it's path across the landscapes,
Like over an aqueduct, that was constructed,
along the watercourse, down to the cascade

it's used in the toilets and the garden,
in fountains and the fire-hydrant system,
and a turbine to make electricity, then
it finally descends into the Derwent

Flow of Ideas

Flow of Ideas	Film Time
Introduction	17:17
Experiment	22:36
Summary	33:21
Rap	34:01

Focus

Curriculum – engineering, history, design & technology, mathematics.

Concepts, themes & skills – controlling water flow; engineering wonders; water flow and use; gravity fed water works; design brief; gravity; pressure; nozzles; relationships between the natural and built environments; impact of people upon the landscape.

Experiment – create a gravity fed water fountain like the Emperor Fountain.

Summary

- Engineers design and make products to fulfil particular needs.
- Design briefs and specifications provide the focus for innovation in projects.
- Understanding the properties of materials allows functioning solutions to be achieved.
- Learning about past and present trends can provide ideas to adopt or improve upon.

Flow of Ideas

Chatsworth Got Flow!

Flow of Ideas Rap Verse

The 6th Duke, he had a passion,
and a head gardener, Joseph Paxton
He said, "Yo Paxton, I've got a big test...
build me a fountain better than the rest"

Now a big issue that he had back then,
Is that all of the fountains were gravity fed,
So, powered by the height that the water descends,
More height, more weight, more pressure at the end.

So Paxton set his sights up the hill,
In 6 months a stream and a lake were built
and a half mile pipe, 15 inches wide,
for carrying the water down the hillside,

where it entered the fountain and flowed through a nozzle
Which meant that the height of the jet was colossal,
And when the Emperor fountain was complete,
It became the highest fountain the world had seen

Flow of Energy

Flow of Energy	Film Time
Introduction	35:51
Experiment	43:05
Summary	49:15
Rap	49:45

Focus

Curriculum – science, engineering, mathematics.

Concepts, themes & skills – what is energy? Potential and kinetic energy; conservation of energy; types of electricity; turbines.

Experiment – Hydro-electricity. Turning the lights on!

Gravitational potential energy = m x g x h
m = mass
g = acceleration due to gravity
h = height

Power = Current x Voltage
P = I x V

Summary

- Energy can be kinetic (KE) or potential (PE).
- Energy can be transferred between different forms.
- The kinetic energy of water can be used to do work.
- Generators convert kinetic energy into electrical energy.
- The amount of hydro power can be found if we know the current and voltage.

Photo above - Chatsworth House light switches in Turbine house.

Flow of Energy

Chatsworth Got Flow!
Flow of Energy Rap Verse

Now let's talk about the transfer of energy
It's vital for nature, for life and society,
and we can get it in a number of ways,
Like chemicals, movement and the Sun rays,

The solar energy gets water up,
then gravitational energy makes it drop,
the energy within the motion is known as kinetic,
And turbines are a great way to collect it,

They rotate from the force of the water,
and transfer that energy to a generator,
Which takes movement and cleverly,
turns in it into electrical energy,

This process is hydroelectric,
and it comes with a bundle of benefits,
a renewable source of energy,
powered by the Chatsworth water artery

Wellbeing & Nature Connection

Focus

Curriculum – cross curricular creative and performing arts. mental health and wellbeing, nature connection, PSHE, creative writing.

Concepts, themes & skills – 5 Ways of Wellbeing; 5 Pathways to Nature Connection; creative writing; performance.

We all benefit from immersing ourselves in nature. Teachers have collaborated with us to develop our learning and engagement offers and asked us to focus upon wellbeing as well as curriculum links. The beauty of the gardens and landscape at Chatsworth are the perfect setting for visits with young people. We offer walks and talks that focus upon all of the themes in this film as well as other cross curricular case study projects.

CELEBRATING THE CASCADE

Learning and Engagement

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Chatsworth House Trust
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