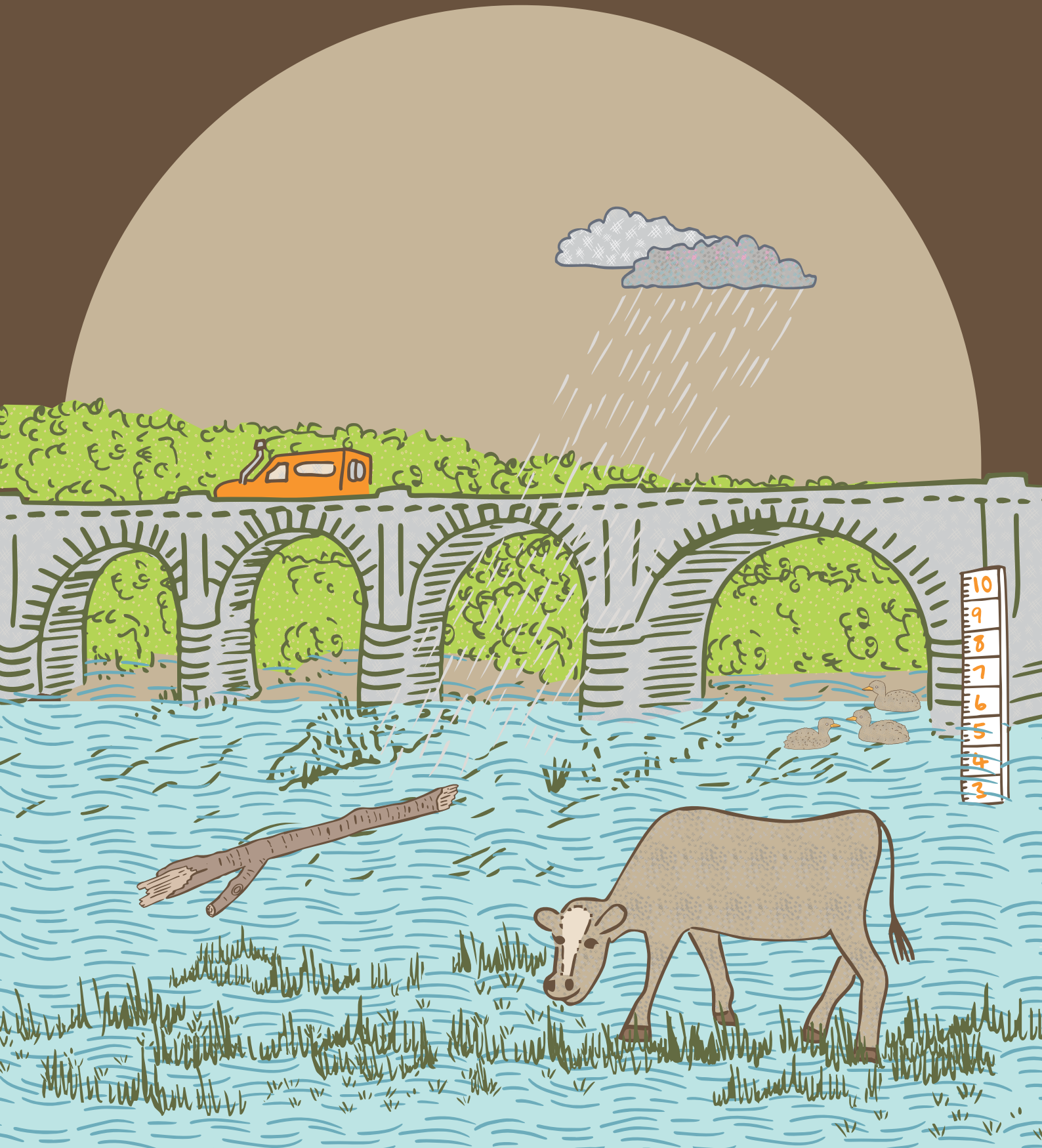
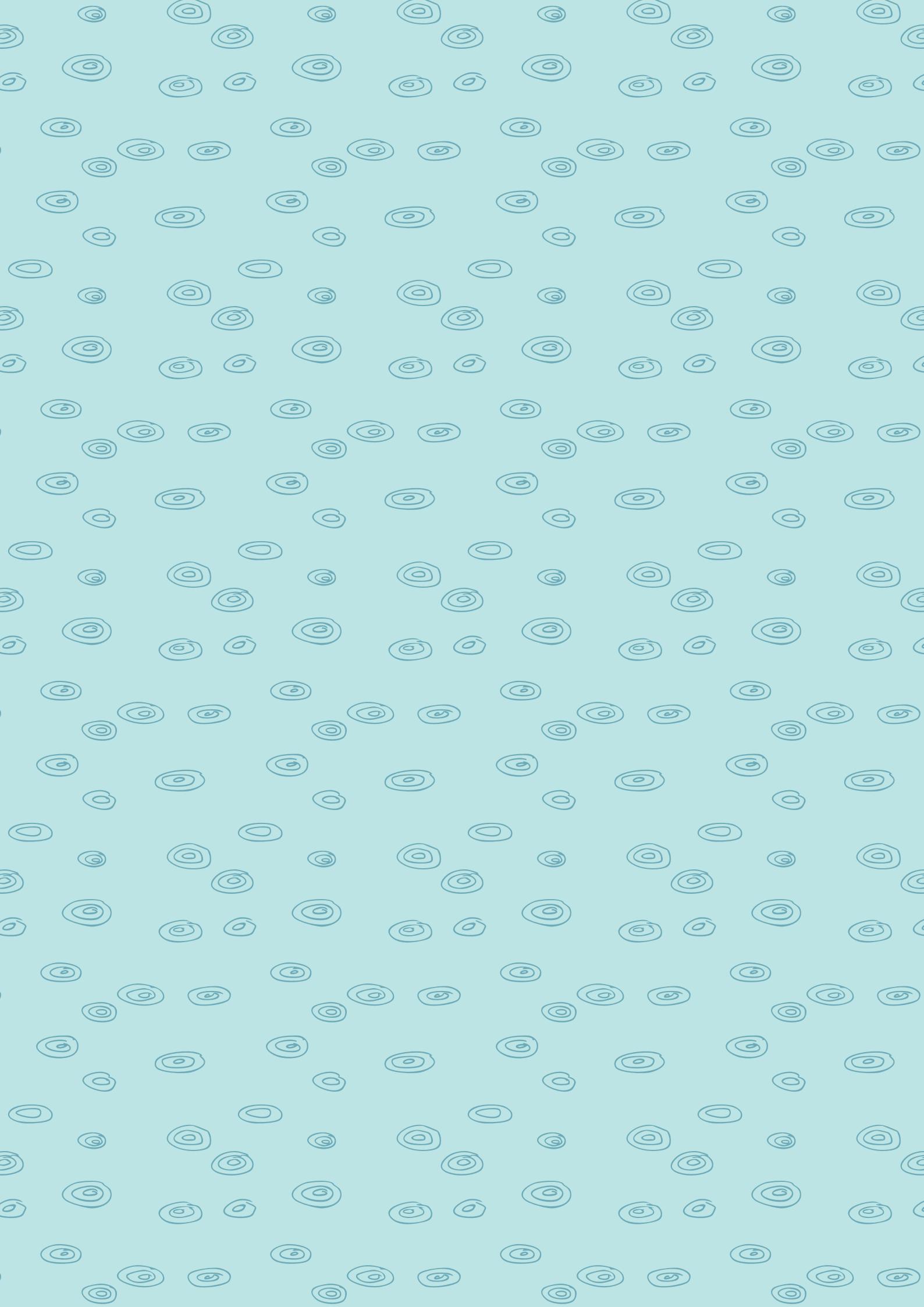


Rising Rivers

Discovering the River Tweed and its Tributaries





Contents

Rising Rivers | TweedWATCH Education Pack

5 Introduction

6 Nature's Flood Guardians

- 6 Background Notes: An Overview of Flooding
- 8 Background Notes: Natural Flood Management
- 10 Investigating Natural Flood Management
in the River Tweed Catchment
- 14 Nature's Flood Guardians Lesson Plan
- 16 River Velocity Float Test Activity Instructions
- 18 River Run Challenge Activity Instructions
- 20 River Flow Rally Activity Instructions
- 22 Flooding: Would You Rather...? Resource
- 23 Nature at Work: Slowing the Flow Spotter Sheet
- 24 People & Machines: Holding Back the Water
- 25 Natural Flood Management Resource Cards
- 28 Flood Defence Photo Cards

30 Worksheets

- 30 River Flooding
- 32 Nature's Flood Guardians: What Are the Impacts of Flooding?
- 34 River Velocity Investigation

36 Glossary

38 Curriculum Links

SECOND LEVEL

KS2



Image: Colin McLean

Rising Rivers

The activities in this section of the Education Pack explore what causes rivers to flood and how both people and nature can help manage the effects. With heavier rainfall and extreme weather becoming more common due to climate change, understanding how water moves through a landscape is more important than ever.

Learners will use observation, practical challenges and team activities to explore how natural and nature-inspired features can slow, store or soak up water. Learners will also compare these with man-made flood defences, and think about how different approaches can work together. The lesson plan in this pack has been written with flexibility in mind. Mix and match the activities that are relevant for your group or class, apply the techniques to any blue space you have access to and carry out the activities over a timeframe that suits you.

Introducing Flooding: Resource signposting

Short Videos

Tweed Forum:

The Eddleston Water Project

film shows how restoring rivers, planting trees, and creating wetlands can help reduce flooding and improve habitats. It's a useful way for learners to see how natural flood management works across a whole catchment.



Cumbria Wildlife Trust: Slow the Flow:

Even Wilder Ideas About Flooding

Stop motion films bring natural flood management (NFM) to life through puppet characters like Twiggy the Red Squirrel. Produced with partners including the EA, RSPB, NFU, SEPA and Wild Ennerdale, the films show how woodlands, wetlands and leaky barriers can slow water, reduce flood risk and support wildlife.

Picture Books

Flood by Alvaro F.Vila: This wordless picture book shows a family preparing for, experiencing, and recovering from a flood. Its illustrations make the emotional and physical impacts of flooding very real for learners. Using this book before introducing natural flood management resources can help learners understand why flood management is important.



Education Resources

Wyre Rivers Trust:

Down to the Wyre - The Natural Flood Management Storybook

This illustrated storybook introduces natural flood management through the journey of the River Wyre. It explains in a child-friendly way how wetlands, woodlands, and other nature-based solutions help slow and store floodwater. A useful resource for teachers to spark discussion or follow up on a lesson on flooding and river habitats.



Check out the **TweedWATCH Education Pack Resource Signposting Padlet** for links to all of the resources referenced.

An Overview of Flooding

Background Notes

What is flooding?

Flooding happens when too much water covers land that is usually dry. Floods are the most common type of natural disaster worldwide and are often linked to extreme weather. As the climate changes, the UK is experiencing heavier rainfall and more frequent flooding in some areas. Flooding can occur suddenly or develop gradually, affecting people, wildlife, and the environment.

Types of flooding

There are several types of flooding, depending on where the extra water comes from and how it interacts with the environment:

River Flooding

River flooding, also known as fluvial flooding, occurs when a river has more water than it can hold and transport, causing it to spill out onto the surrounding land. This is often caused by long periods of heavy rain, rapid snow or ice melt, or occasionally when a dam or levee fails.

How to recognise it: Water flowing over riverbanks into fields, paths or towns.

Coastal Flooding

Coastal flooding happens when seawater floods onto land, usually during storms, extreme high tides, or storm surges caused by strong winds.

How to recognise it: Waves or seawater covering beaches, roads, and low-lying coastal land.

Surface Water Flooding

Surface water flooding, also known as pluvial flooding, happens when heavy rainfall cannot soak into the ground or drain away quickly enough. The water collects on the surface and can flood streets, fields, roads or other areas of land. Blocked drains and sewers can make this type of flooding even worse.

How to recognise it: Water pooling on streets, roads, or open ground soon after heavy rain.

Groundwater Flooding

Groundwater flooding happens when the ground is already saturated and cannot soak up any more water. Water is normally stored in layers of rock and soil underground, but when these are full, the water rises to the surface. This can flood fields, parks and even basements of buildings, and it often lasts for weeks.

How to recognise it: Waterlogged ground or fields that stay flooded long after heavy rain has stopped.



Impacts of Flooding

Flooding can affect both people and the environment in many different ways.

Impacts on People

- Risk of injury or loss of life.
 - Contaminated floodwater can spread disease.
 - Stress and trauma can lead to lasting mental health problems.
 - Families may lose their homes and their belongings.
 - Shops, offices and local businesses may be forced to close.
 - Disruption to public services such as hospitals, schools and emergency care.
 - Transport networks, including roads, bridges and rail links, can be damaged.
 - Power lines and electricity supplies may be cut off.
 - It can hit hardest in communities that are already struggling with poverty.
-

Impacts on the Environment

- Wildlife habitats can be lost or badly damaged.
 - Freshwater ecosystems like ponds, lakes, lochs and rivers can be polluted by sewage, chemicals or litter.
 - Fast-flowing water can erode riverbanks and wash away the soil.
 - Rivers can change shape, becoming wider in places or depositing more silt downstream.
 - Fast-flowing water can uproot trees and wash away vegetation.
 - Sediment left on farmland can smother crops and reduce soil quality.
 - Sudden changes in water levels can harm fish, insects and birds.
-

Climate change & flooding

Rising global temperatures are changing weather patterns and making extreme rainfall events more common and intense. Heavy rain, combined with rising sea levels, means rivers and coasts are more likely to flood.

Flooding can wash away soil and damage habitats. When floods become more frequent or severe, it is harder for plants and animals to recover, leading to a loss of biodiversity and a weaker, less resilient ecosystem.

Healthy habitats such as wetlands, woodlands, peatlands and ponds help slow and store water and also lock up carbon, which helps to limit further climate change. Protecting and restoring these habitats is vital to help both people and wildlife adapt.



Image: Colin McLean

Background Notes

Natural Flood Management

What is natural flood management?

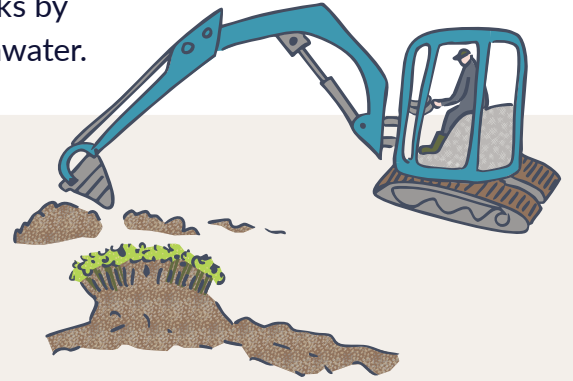
Natural flood management (NFM) is a way of working with nature to reduce the risk of flooding to communities downstream. It works by utilising natural processes to slow down, store and soak up rainwater.



Native Woodland

Trees help reduce flooding in several important ways.

- Tree roots grow through the soil, creating spaces and channels that allow water to soak more quickly into the ground. This means less water runs off the surface and into rivers, a process known as infiltration.
- The tree canopy, made up of the leaves and branches at the top, intercepts rainfall, slowing it down before it reaches the ground. This helps to reduce the impact of a storm over a longer period. Some of the water that lands on the leaves evaporates into the atmosphere, further reducing the amount of water that reaches the river.



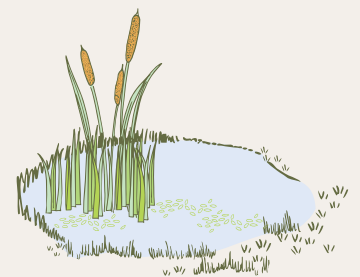
Peatland Restoration

Peatland is a type of wetland where dead plants have slowly built up over thousands of years to form an important material called peat. Peat is mostly made up of sphagnum moss. These plants don't fully decompose because the conditions are wet, low in oxygen and acidic.

- Sphagnum moss has an amazing ability to hold water. It acts like a sponge, soaking up rainfall and slowing the flow of water across the land.
- When peatland is damaged, there is less sphagnum moss to absorb water. The bare, exposed peat can lead to faster surface run off into rivers, which increases the risk of flooding downstream. This is why restoring peatland is an important, natural way to help reduce the risk of flooding.

Ponds and Wetlands

- Ponds and wetlands absorb and store rainwater during periods of heavy rainfall. This prevents large volumes of water from reaching rivers all at once, reducing the risk of surges and helping to protect downstream communities from flooding.
- In wetlands, the uneven landscape and dense ground vegetation slows the flow of surface water, allowing more time for it to soak into the ground.

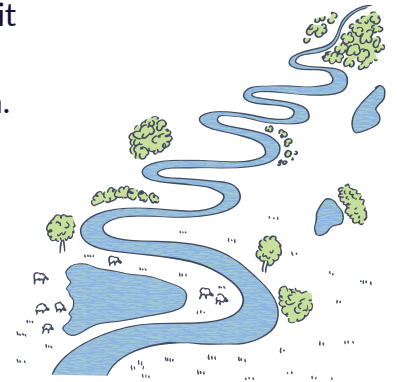


River Re-meandering

Historically, many rivers were straightened to make space for agriculture and to dry out the surrounding land for the construction of roads and railways. While this increased the speed of water flow and made the transport of goods quicker and more efficient, it also had several negative consequences. Straightening rivers increased soil erosion, degraded water quality and raised the risk of flooding downstream.

Re-meandering is an important natural flood management measure that restores a river's natural, winding shape.

- Meanders not only lengthen a river, but also introduce more bends, which force the water to curve back and forth. This creates friction and slows the flow of water.
- The wiggly shape increases the volume of water the channel can hold.
- Meanders also help reconnect the river to its floodplains (flat areas of land beside the river). During periods of heavy rainfall, these floodplains allow excess water to spread out from the main channel. Some of this water soaks into the ground, and the rest gradually flows back into the river.



Wider Benefits of these Natural Flood Management Measures

The above natural flood management measures not only reduce the risk of flooding to communities downstream, they also provide broader ecosystem services (benefits provided by nature for people).

Improve
Water
Quality

Creation
of Habitats

Reduce
Soil Erosion



Increase Biodiversity

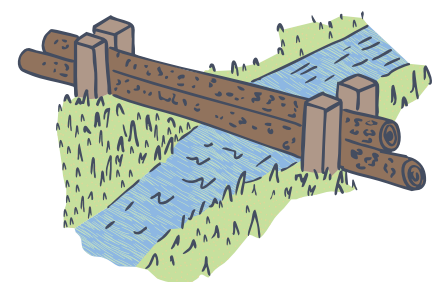
Storing Carbon to Slow Global Warming

Structural Natural Flood Management Measures

Leaky Barriers

A leaky barrier is a structure suited to smaller river channels that mimics the natural obstructions created by fallen trees and branches. These barriers sit above the natural level of a stream (or slightly submerged), allowing water and wildlife to move freely beneath them. During high flows, excess water is slowed, and some water passes through the gaps, while the rest is diverted onto nearby floodplains.

This structural, natural flood measure works well alongside native woodland planting, re-meandering, peatland restoration and the creation of ponds and wetlands to slow the flow of river water.



Investigating Natural Flood Management in the River Tweed Catchment

Images:

1. Colin McLean
2. Tweed Forum,
- 3-7. Colin McLean
8. Tweed Forum,

Eddleston Water Project

The Eddleston Water Project is managed by Tweed Forum and funded by the Scottish Government and the Scottish Environment Protection Agency (SEPA). This is a long-term study examining the effects of natural flood management techniques on flood risk to downstream communities and the improvement of wetland habitats for wildlife, and improving farm resilience to global warming.

1.



Eddleston Water

Eddleston Water is a tributary of the River Tweed that merges with the main river at Peebles. Since the 19th century, parts of the river have been straightened to allow the water to flow more quickly throughout the valley. The idea was to make the surrounding land drier and easier to build roads and railway lines, and to farm. However, this increased the risk of flooding for communities downstream, damaged wetland habitats and reduced biodiversity.

What the Project Aims to do

- Investigate the effectiveness of natural flood management (NFM) techniques on reducing the risk of flooding to downstream communities.
- Explore how restoring natural flood management features impacts wetland habitats and wildlife, and how it can improve the overall health of the ecosystem.
- Work with local farmers and landowners to maximise the project's benefits for both nature and those who live and work on the land.

2.



**Eddleston Water before
Natural Flood Management**

3.



**Eddleston Water after
Natural Flood Management**

Eddleston Water Restoration: What's happened so far

Tweed Forum has worked with farmers to deliver the following natural flood management measures:

4.



A significant stretch of river has been re-meandered and flood banks removed, connecting the river with its floodplain.

5.



A large pond created at Kidston as a temporary store for flood water.

6.



Large scale tree planting has transformed the landscape, creating new woodland habitats.

7.



A range of new upstream ponds have been created to hold water and support wildlife.

8.



A large number of leaky barriers have been installed.

Monitoring the River

The project collects a wide range of data about the river to monitor how effective natural flood management techniques (NFM) and restoration efforts are at reducing flood risk and improving habitats.

Image: Colin McLean

- A hydrometric network measures water as it enters and flows through the catchment. It does this via water level gauging stations, rain gauges, atmospheric pressure recorders, rain recorders and a weather station. Groundwater levels are surveyed using boreholes.
- Ecological monitoring includes collecting data on river biology, such as invertebrates, fish and plants present. Aquatic invertebrates in the flood storage ponds are also surveyed.
- The costs and benefits of NFM measures are assessed by examining the flood damage that has been avoided and the wider benefits achieved. These include improvements in biodiversity, carbon management through reduced emissions, enhanced water quality and improved public access.

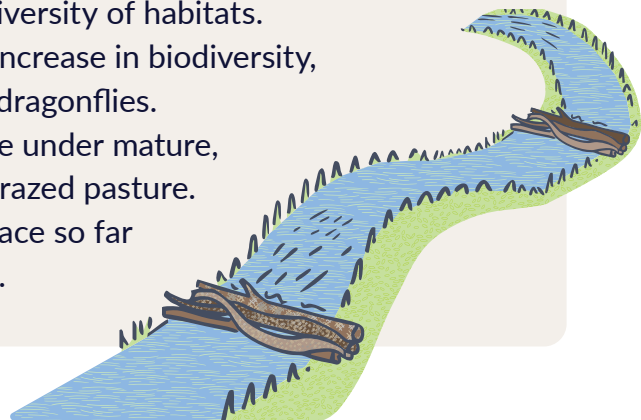


Gauging station

What we've discovered

The data collected so far is beginning to show a clear picture of the benefits of natural flood management (NFM). Here are some of the highlights:

- Different NFM measures can reduce flood risk by slowing the flow, storing surface water temporarily and by delaying peak floods.
- Re-meandering and reconnecting the river to the floodplain can improve flood storage by up to 6%. Re-meandering alone is less effective though.
- New meander channels have an increased diversity of habitats.
- Creating flood storage ponds leads to a big increase in biodiversity, providing homes for animals like newts and dragonflies.
- Rain soaks into the ground 5 to 8 times more under mature, broadleaf woodland than it does in nearby grazed pasture.
- The NFM measures that have been put in place so far have helped avoid significant flood damages.



What's next?

Tweed Forum wants to share and test their learning in other river catchments. They hope to work with farmers to put more natural flood management measures into action and are exploring opportunities to raise funds to continue restoration work within the catchment.

You can read more about the Eddleston Water Project on the Tweed Forum website.

Image: Colin McLean



Nature's Flood Guardians

Lesson Plan



Learning Objectives

- Describe how natural features like meanders and trees slow down water.
- Compare nature-based and man-made flood defences.
- Apply natural flood management ideas to solve a problem as a team.



Equipment & Resources

- Clipboard & pencils, hula hoops/rope circles, large paper or whiteboard for group work

Vocabulary

Flooding, runoff, floodplain, meander, wetland, peatland, leaky barrier, velocity, flood defence, downstream

Introduction

If this is your first session on the topic of flooding, start by using any of the resources signposted on the **Introduction Page** to introduce the subject.

As a starter activity, use the **Flooding Worksheets (p.30)** to check your learner's prior understanding and to guide a class conversation about what flooding is, its causes and types, the impacts on people and nature, and the actions we can take. This will give the class a useful background before moving on to natural flood management.

Would You Rather...? (10m)

To build discussion after your introduction, play a quick warm-up game using the **'Would You Rather...? Statements Resource' (p.22)** to get your class moving and thinking. Mark two areas of your space (one for option A and one for option B). Read each statement aloud and ask learners to move to the side that matches their choice. Invite a few to explain why they chose that side. There are no right or wrong answers, just a chance to spark conversation.

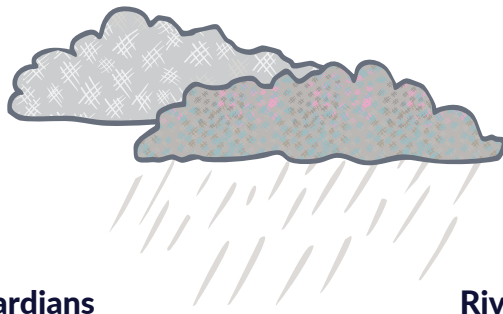
Activities

Nature vs. Man-made Flood Defenders (40m)

Take your class for a short walk beside a river or stream and give each group a copy of the **Nature at Work: Slowing the Flow Spotter Sheet (p23-24)**. Point out that one side of the sheet shows natural features like native woodland, wetlands or meandering channels. Explain that these are 'nature's flood guardians' because they help slow, store or soak up water. The other side of the sheet shows human-built flood defences, such as dams, flood walls and embankments, which are designed to hold water back or move it quickly downstream.

Ask learners to look carefully and tick off any features they can find. Pause at interesting spots to talk about how each feature reduces flooding and compare the roles of nature-based solutions with engineered structures. Finish by asking the group which features they spotted most and what surprised them.





Activities (cont.)

Meet the Flood Guardians Sorting Challenge (10–15m)

This activity works well after the river walk or before a practical challenge. Use three hula hoops or rope circles on the floor to create a Venn diagram with the headings: slows water, stores water and soaks up water. Give learners the **Natural Flood Management Resource Cards (p.25-27)** and ask them to place each one where they think it belongs. Some cards may sit in the overlap between two circles. Encourage discussion and reasoning as they sort. To finish, invite learners to explain one choice or move a card if needed. This can be run in two ways: as a whole class using one large Venn diagram and a single set of cards, or in small groups, with their own diagrams and card sets.

River Velocity Investigation (40–60m)

Measure how fast the river is flowing by timing a floating object over a set distance. This hands-on investigation shows how scientists measure river speed, an important factor in flood warnings, and how natural features such as meanders and woody 'leaky barriers' can help slow the flow. See the **River Velocity Float Test Activity Instructions (p.16)** for full details, and give each group a copy of the **River Velocity Investigation Worksheet (p.34)** to record times and calculate velocity.

River Run Challenge (40m)

Focus on some of the natural flood management features of a river with a lively teamwork challenge. Learners work in groups to build a 'river run' that makes a ball travel from top to bottom as slowly as possible, representing how meanders and obstacles slow water in a real river. See the **River Run Challenge Activity Instructions (p.18)** for step-by-step guidance and equipment suggestions.

River Flow Rally (40m or more for large groups)

Learners apply their knowledge of natural flood management (NFM) in this active team challenge. Working in groups, they design a river obstacle course that slows the movement of 'rainwater' without completely blocking it, using features such as meanders, leaky barriers, wetlands, trees, and peatlands. Another team then travels their course to test how well it works. See the **River Flow Rally Activity Instructions (p.20)** and accompanying Resource Cards for set-up guidance, NFM feature summaries and challenge prompts.

Plenary

Give each group a set of the **Flood Defence Photo Cards (p.28-29)**. Ask them to work together to rank the features from most to least helpful in reducing flooding. There are no right answers; the aim is to encourage learners to discuss their choices. Finish by asking a few groups to share one decision they made and why.



Image: Phil Wilkinson

River Velocity Float Test

Activity Instructions

Description

Discover how fast the river is flowing by timing how long a floating object takes to travel a set distance. This simple test shows how scientists measure river speed, a key factor in flood warnings, and how they check whether natural flood management features, such as leaky barriers or meanders, are successfully slowing the flow.

What you'll need

- Small, floating objects like a twig/stick, dog biscuits or small oranges (biodegradable and safe for wildlife), tape measure, stopwatch (per group), clipboards and pencil, calculator, cones to mark the start & finish line (optional)



Instructions

Before you start

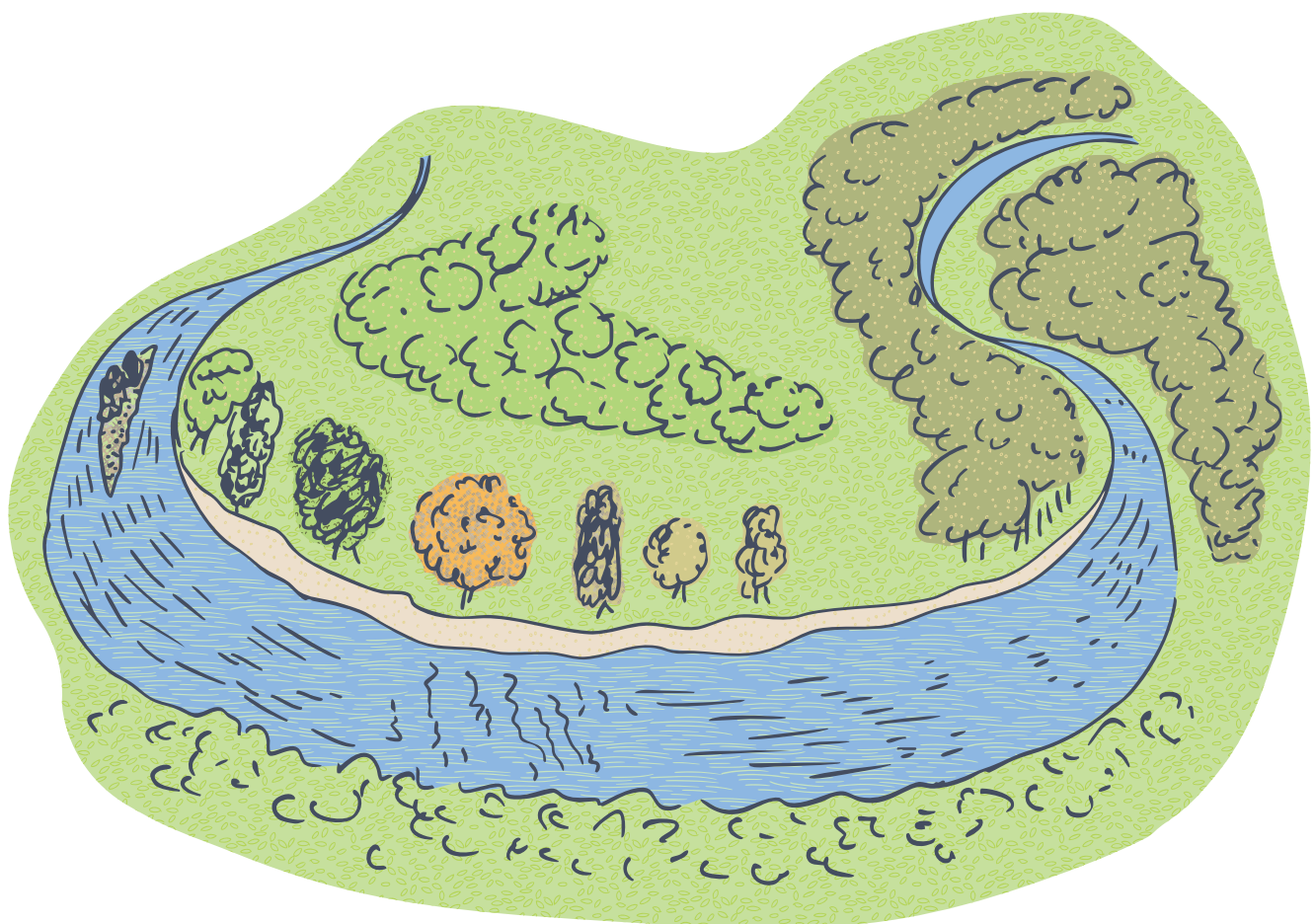
- Divide the class into small groups (for example, 5 pupils per group).
- Give each group a **River Velocity Investigation Worksheet (p.34)**, a clipboard and pencil, a stopwatch and some floats (dog biscuits or similar).
- **Tip for limited space:** If there isn't enough room for several 10 metre stretches, you can either run the test as a whole class activity or stagger the groups, with each group taking a turn to use the same 10 metre stretch.

Main activity

- **Choose a safe stretch of riverbank.** Look for shallow water with a slow to moderate flow. Avoid doing the activity after heavy rain.
- **Measure and mark the test section.** Measure 10 metres along the bank and mark the start and finish lines with cones. If you don't have cones, use large sticks or rocks and leave the measuring tape in place as a guide.
- **Prepare the groups.** Ask your learners to get ready with their worksheet and stopwatch. Each group chooses who will be the timer and who will record the results.
- **Release the float.** One of the learners will drop or throw the dog biscuit (or other floating object) into the water upstream of the start line so it has time to reach the river's speed.
- **Time the float.** One learner starts the stopwatch as soon as the float passes the start line and stops it when it crosses the finish line. Another learner records the time in seconds on the worksheet.
- **Repeat and average.** Learners should repeat the test 3-5 times and calculate the average time.
- **Calculate the river's speed (velocity).** Learners divide the distance (10 metres) by the average time in seconds and record the velocity on their worksheet.

Investigations to try

- **Straight stretch vs meandering section:** Overall, river water usually travels faster through a straightened section than through a naturally meandering section, because the water takes a shorter, more direct path. This shows that straightening a river can speed up the flow and send floodwater downstream more rapidly.
- **Upstream vs downstream of a natural 'leaky barrier':** You should see the water moving more slowly just downstream, as the barrier holds back some of the flow. This demonstrates how natural features, such as fallen trees or a tangle of sticks, can help slow water and reduce the risk of flooding.
- **Narrow section vs wide section:** Flow is often faster where the channel is narrower and can be slower where the river spreads out. This highlights how the width of a river channel affects speed and water levels.



River Run Challenge

Activity Instructions

Description

This hands-on challenge is a lively way to bring river features and natural flood management to life. As learners work together to design a 'river run' that slows a ball's journey, they practise problem-solving, creativity, and teamwork, while exploring how meanders, obstacles, and other river features help to slow the flow of water in nature.

What you'll need

- Half-pipe bamboo chutes, sections of guttering, cut pool noodles, or recycled plastic piping, a ball for each team, stopwatch or timer

1.



How to play

Location

A woodland is an ideal location for this activity. Learners can use trees, stumps and other loose parts to support their design. It can also be adapted for school grounds or even a sports hall, using available features or equipment.

Instructions

- Split the class into small teams and give each team the same set of materials and a ball.
- Explain the challenge: Construct a continuous 'river run', like a giant marble run, where the ball travels from top to bottom in the longest time possible without stopping.
- Run it in two stages (build first, then redesign to slow the ball) or as one big challenge if time is short.
- Encourage teams to think about real river features, such as meanders, deadwood in the water, or other small obstacles that slow water in nature.
- When all teams are ready, drop the ball at the top of one of the team's 'river run' and time its journey to the bottom. Repeat this for all of the team's 'river runs', compare times and discuss which designs worked best and why.

2.





HOW SLOW CAN YOU GO?

River Flow Rally

Activity Instructions

Description

Learners will apply their knowledge of Natural Flood Management by designing an obstacle course river in this exciting team challenge. Another team will then navigate this course, acting as rainwater. The goal is to slow the flow of water enough to prevent flooding in a nearby town, without blocking the water entirely.

What you'll need

- Large, flat space to play
- **Obstacles option 1:** A range of P.E. equipment (e.g. cones, hoops, skipping ropes, bean bags)
- **Obstacles option 2:** Access to a range of natural loose parts (e.g. sticks, logs, leaf piles)
- Blue rope to outline the river path.
- Stopwatch

Setting up

- **Choose and check the space:**
A hall, playground, field or woodland (remove any tripping hazards).
- **Split your group into equal teams:**
Around 4-8 learners in each team.
- **Mark team zones:** Give each team a clearly marked area to build their river (15-25 metres from start to finish; 10-20 metres if the woodland has rough ground). Set the start and finish lines with cones or bright tape.
- **Provide equipment:** Equal sets of either P.E. equipment or safe natural resources. Learners could gather their own items if they're based in a woodland. You can give them a set collection time and remind them not to pick anything alive or damage the habitat.
- **Explain the aim of the game:** Teams must design a river that slows the flow of rainwater enough to protect a town from flooding without blocking the water completely.
- **Time limits:** 10 minutes for building before you check the course for safety.
- **Optional resource:** Natural Flood Management Resource Cards. Print and cut out the 6 half-page cards. Each card gives a simple explanation of a Natural Flood Management (NFM) feature. The first card summarises the game and sets a challenge for each feature. You can give one set to each team or have a set in a central area for learners to check on for inspiration during the activity.





How to play

Build the river

Each team creates a river course using their equipment and the natural features of the space.

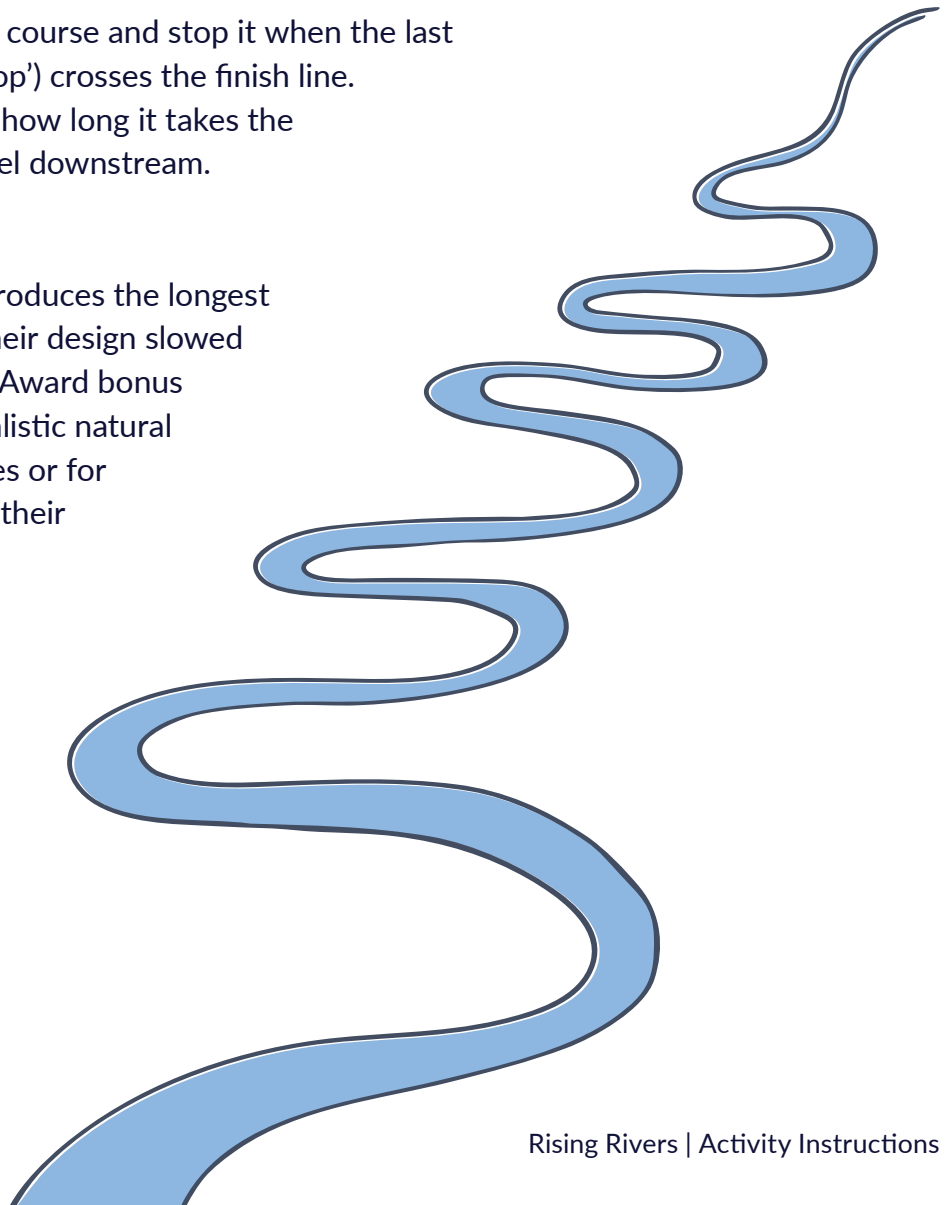
- **Meanders:** Winding the course with cones/ropes.
- **Leaky barriers:** Using logs, benches, or sticks that players must crawl over or under.
- **Wetlands:** Areas where rainwater must move in circles or balance on stepping stones.
- **Native woodland:** Weave side to side around cones or real trees.
- **Peatland:** Bog bounce – hop or bounce across a marked bog made from hoops, mats, or a roped-off patch to represent the springy moss of a peatland.

Swap and run: Teams exchange courses.

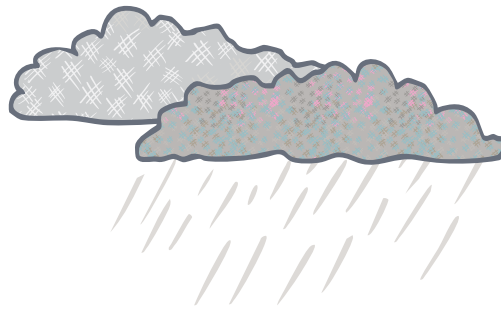
- **Timing the flow:** Start the timer when the first team member (first 'raindrop') begins the course and stop it when the last team member (last 'raindrop') crosses the finish line.
- This total time represents how long it takes the whole 'flood wave' to travel downstream.

Score

- The team whose course produces the longest total time wins because their design slowed the flow most effectively. Award bonus points for creative and realistic natural flood management features or for clear explanations of how their design reduces flooding.



Flooding



Would You Rather?

A

B

- Live next to a river, where there is a beautiful view but a risk of flooding.
 - Help plant trees to slow floodwater.
 - Experience a short, heavy downpour that causes surface water flooding.
 - Be part of a team rescuing wildlife after a flood.
 - See a flood caused by a storm surge at the coast.
 - Help design rain gardens and ponds to soak up rain.
 - Watch a fast, dramatic flash flood from a safe place.
- Live on a hill, where it is safer from floods, but a longer walk to enjoy the river.
 - Help build a big flood wall to protect the town.
 - Experience a slow, week-long river flood that rises steadily.
 - Be part of a team clearing mud and debris from the streets.
 - See a flood caused by melting snow and ice in the hills.
 - Work on warning systems that tell people when floods are coming.
 - See a quiet wetland slowly filling and protecting the town.

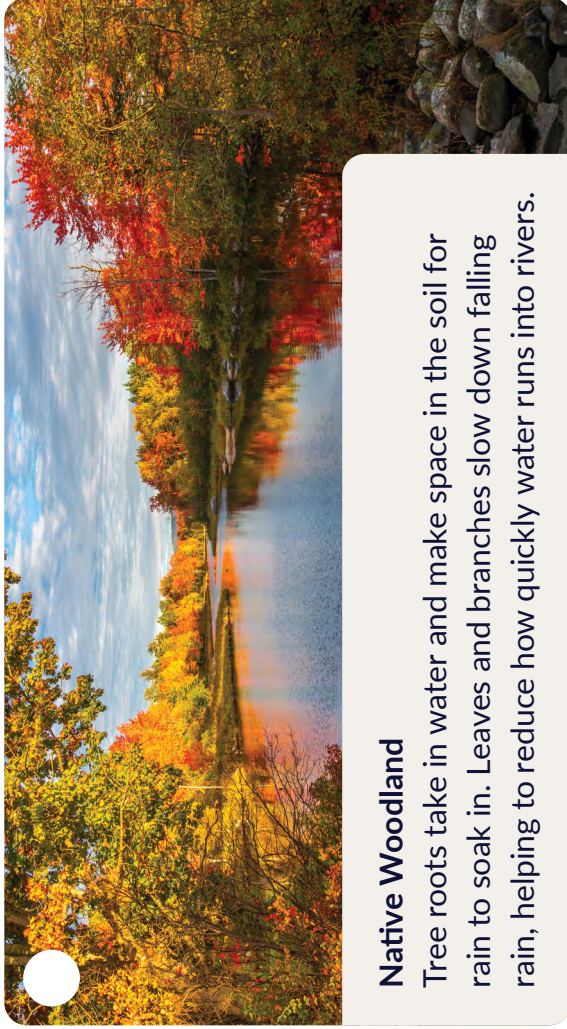


Nature at Work: Slowing the Flow

Images: Phil Wilkinson

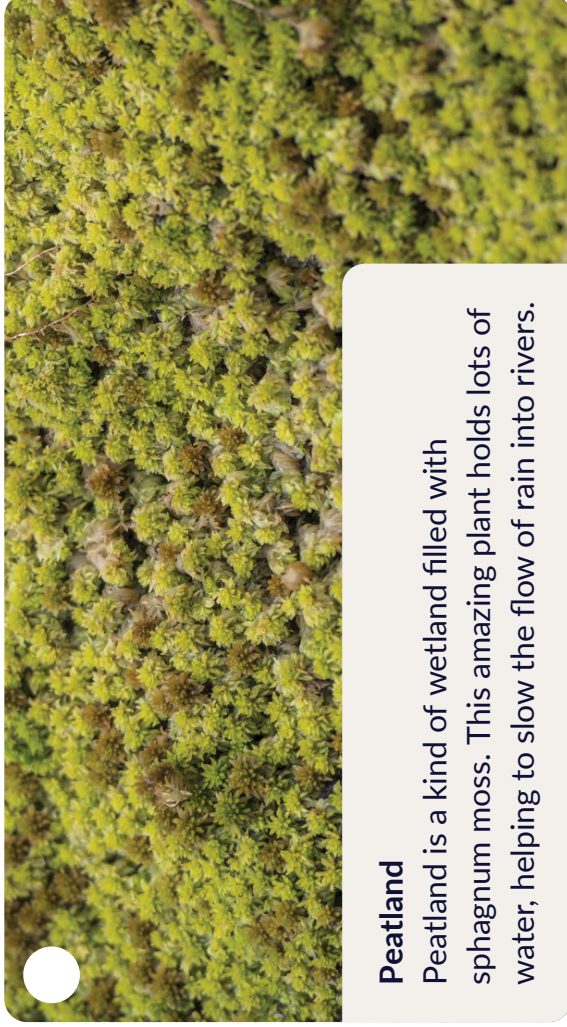


Some flood defences are inspired by nature! These features help to slow down the water and give it space to spread out. Explore your local river and see how many you can spot.



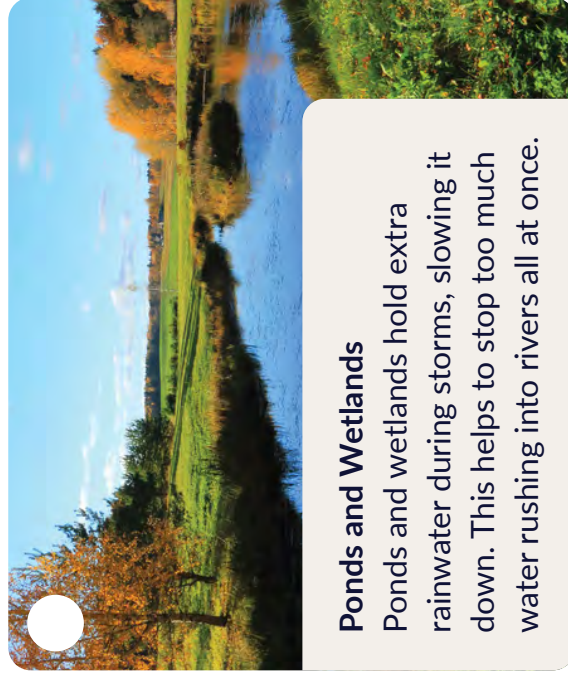
Native Woodland

Tree roots take in water and make space in the soil for rain to soak in. Leaves and branches slow down falling rain, helping to reduce how quickly water runs into rivers.



Peatland

Peatland is a kind of wetland filled with sphagnum moss. This amazing plant holds lots of water, helping to slow the flow of rain into rivers.



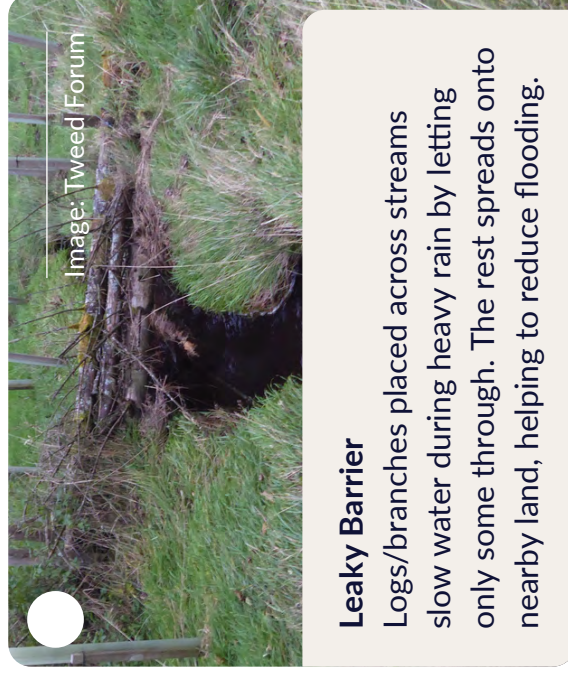
Ponds and Wetlands

Ponds and wetlands hold extra rainwater during storms, slowing it down. This helps to stop too much water rushing into rivers all at once.



Meandering Channel

The bends in the river make the water's path longer and create more friction, which helps slow the flow of the water.

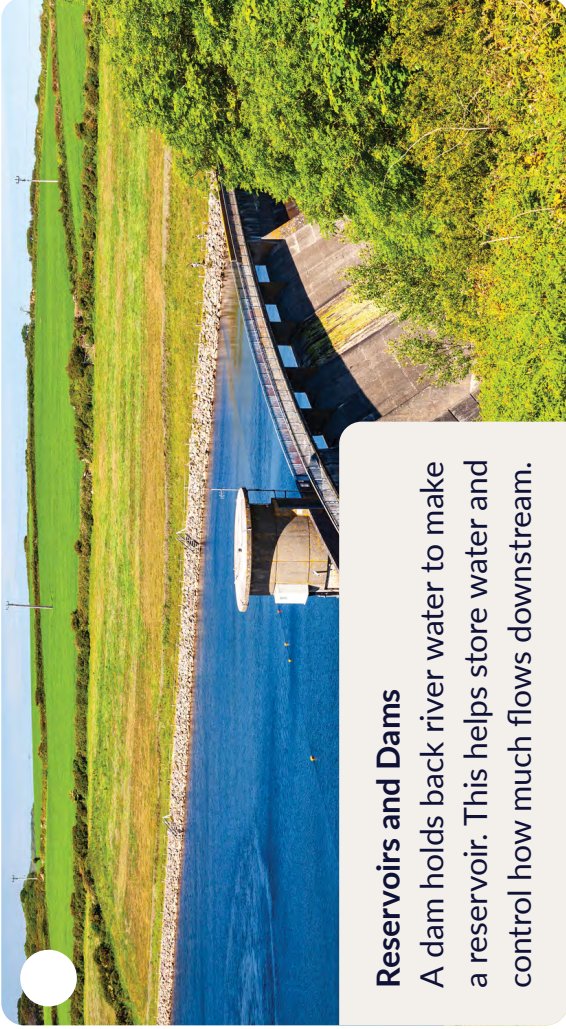


Leaky Barrier

Logs/branches placed across streams slow water during heavy rain by letting only some through. The rest spreads onto nearby land, helping to reduce flooding.

People & Machines: Holding Back the Water

Sometimes, when there isn't enough space or time to slow the flow naturally, strong structures are used to help keep floods away from homes and roads. People make these features, which help manage water that's already moving across the land or towards the river, especially during heavy rainfall. How many features can you spot around your river?



Reservoirs and Dams

A dam holds back river water to make a reservoir. This helps store water and control how much flows downstream.

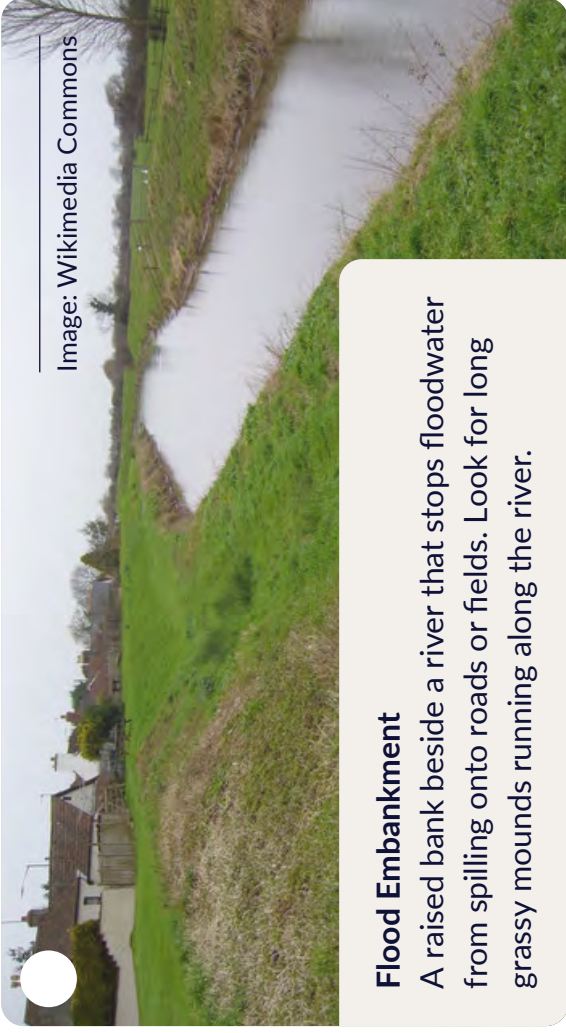


Image: Wikimedia Commons

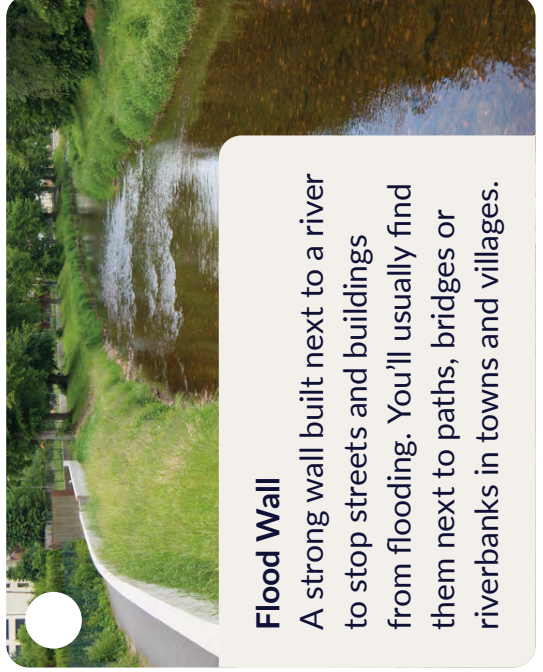
Flood Embankment

A raised bank beside a river that stops floodwater from spilling onto roads or fields. Look for long grassy mounds running along the river.



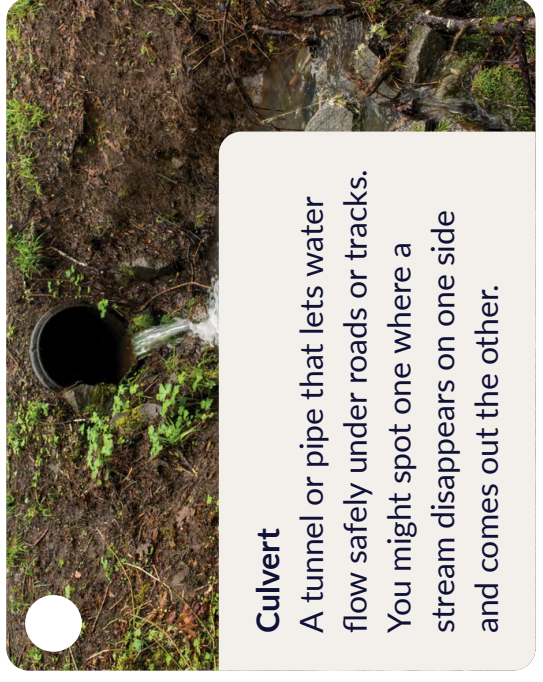
Flood Control Channels

Specially built channels that help divert extra water away from important areas during heavy rainfall, helping to prevent flooding.



Flood Wall

A strong wall built next to a river to stop streets and buildings from flooding. You'll usually find them next to paths, bridges or riverbanks in towns and villages.



Culvert

A tunnel or pipe that lets water flow safely under roads or tracks. You might spot one where a stream disappears on one side and comes out the other.

Natural Flood Management: Resource Cards

River Flow Rally



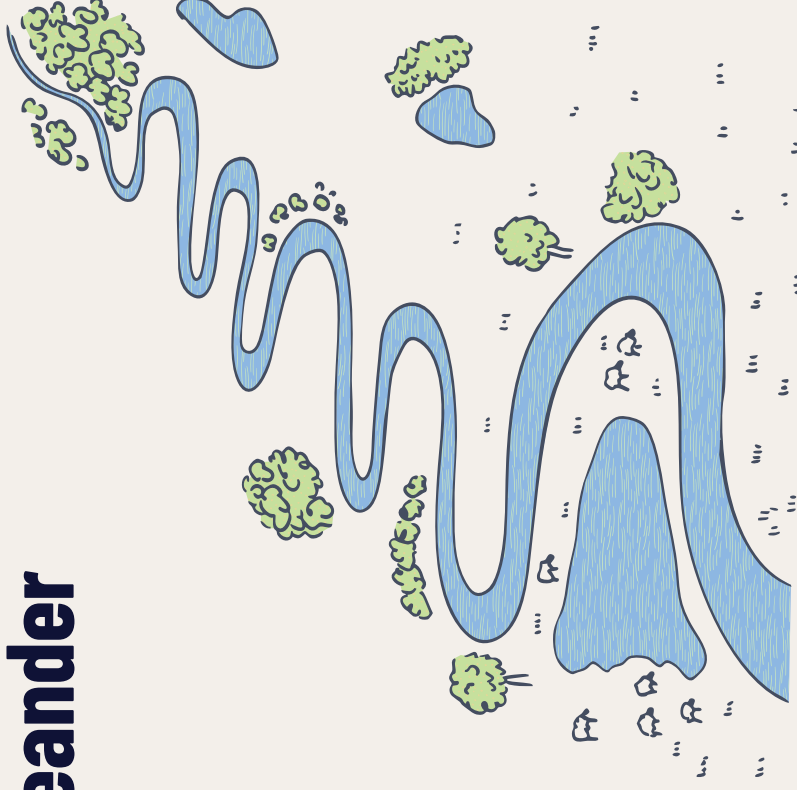
Your team must build a river obstacle course that delays the flood but still lets the water flow!

.....

- **Meander:** Make your river path twist and turn.
- **Peatland:** Create a 'bouncy bog' where raindrops must hop across hoops or mats.
- **Native Woodland:** Set up a zig zag path to weave through.
- **Leaky Barrier:** Add something to crawl under or climb over.
- **Wetlands/Ponds:** Create a place where the 'rainwater' must go in a loop or balance on stepping stones.



Meander



What it is:

When a river bends and twists.

Why does it help reduce flooding?

Meanders lengthen the river and cause more friction, slowing down the water before it reaches downstream.

Natural Flood Management: Resource Cards

Native Woodland



What it is:

Native trees planted along the riverbank.

Why does it help reduce flooding?

The tree roots take in rainwater from the soil, and their leaves slow the raindrops, so less water runs straight into the river.

Leaky Barrier



What it is:

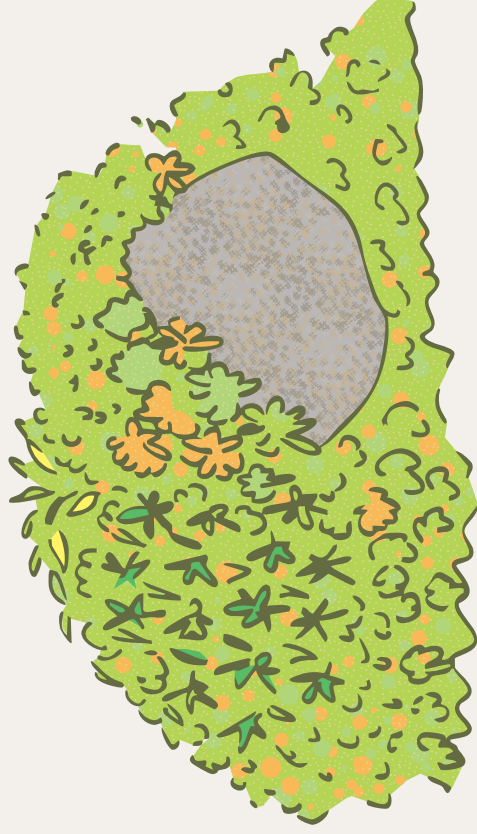
Small barrier made from logs or sticks with gaps for water to trickle through.

Why does it help reduce flooding?

It holds back some water so it doesn't all rush downhill at once.

Natural Flood Management: Resource Cards

Peatland



What it is:

A special type of wetland, made up of layers of peat and covered in moss.

Why does it help reduce flooding?

Peatland soaks up rainwater like a sponge and releases it slowly, which reduces flooding downstream and slows the raindrops, so less water runs straight into the river.

Ponds & Wetlands



What it is:

Shallow, soggy areas with water, reeds, grasses and small ponds where water gathers after rain.

Why does it help reduce flooding?

Wetlands and ponds act like a giant bowl, catching extra water during heavy rain and letting it drain back into the river slowly.





Flood Wall



Native Woodland



Peatland



Flood Control Channel



Drainage Grate



Wetland

River Flooding

What is flooding?

Flooding happens when too much water covers land that is usually dry. This can happen in different ways, but all floods can cause problems for people, wildlife, and the environment.

What are the different types of flooding?

There are different types of flooding, depending on where the extra water comes from and how it interacts with the environment.

Use arrows to match each type of flooding with the right description.



River Flooding



Coastal Flooding



Surface Water Flooding



Ground Water Flooding

When heavy rain falls too quickly and collects in streets and fields instead of draining away.

When there is too much water for the river to hold and transport, so it spills out.

When the land is flooded with seawater, often during storms or very high tides.

When the ground can't soak up any more water and it rises to the surface, flooding the land.

What causes flooding?

There are many reasons why flooding might happen. Some are to do with the weather, and others are to do with how people look after the land. **Look at the pictures below.**

Circle the ones that can cause flooding.

Heavy Rain



Melting Snow or Ice



Strong Sunshine



Storms at Sea



Campfire



Blocked Drains & Sewers



Tree Planting



River Flooding

Answer Sheet

What is flooding?

Flooding happens when too much water covers land that is usually dry. This can happen in different ways, but all floods can cause problems for people, wildlife, and the environment.

What are the different types of flooding?

There are different types of flooding, depending on where the extra water comes from and how it interacts with the environment.

Use arrows to match each type of flooding with the right description.



River Flooding



Coastal Flooding



Surface Water Flooding



Ground Water Flooding



When heavy rain falls too quickly and collects in streets and fields instead of draining away.

When there is too much water for the river to hold and transport, so it spills out.

When the land is flooded with seawater, often during storms or very high tides.

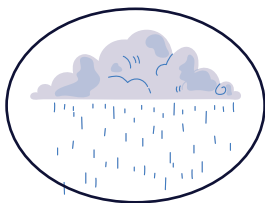
When the ground can't soak up any more water and it rises to the surface, flooding the land.

What causes flooding?

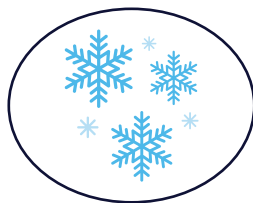
There are many reasons why flooding might happen. Some are to do with the weather, and others are to do with how people look after the land. **Look at the pictures below.**

Circle the ones that can cause flooding.

Heavy Rain



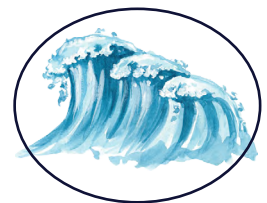
Melting Snow or Ice



Strong Sunshine



Storms at Sea



Campfire



Blocked Drains & Sewers



Tree Planting



Natures Flood Guardians

What are the Impacts of Flooding?

Flooding can affect both people and the natural environment.

How does flooding affect people and nature? Write or draw your ideas in the boxes below.

*Hint: Think about what happens to people's homes during floods, or what might happen to wildlife when water becomes polluted, to get you started with your answers.

People

Nature



What can we do about it?

Flooding can't be stopped completely, but there are ways to reduce the damage and help nature cope. List or draw ideas for how we can help (as individuals or as a community) to reduce flooding or its impacts.

*Hint: Think about things people or communities might do to slow down rainwater or keep rivers cleaner, both in the countryside and in towns, to get you started with your ideas.



Natures Flood Guardians

What are the Impacts of Flooding?

Flooding can affect both people and the natural environment.

Answer Sheet

How does flooding affect people and nature? Write or draw your ideas in the boxes below.

**Hint: Think about what happens to people's homes during floods, or what might happen to wildlife when water becomes polluted, to get you started with your answers.*

People

- Homes and belongings damaged or destroyed.
- Transport links cut off.
- Drinking water contaminated.
- Illness from polluted water.
- Loss of income for businesses.
- Stress and anxiety for families.

Nature

- Wildlife habitats washed away.
- Riverbanks eroded.
- Water pollution from litter, sewage and chemicals.
- Trees and plants uprooted.
- Wildlife harmed by fast water.



What can we do about it?

Flooding can't be stopped completely, but there are ways to reduce the damage and help nature cope. List or draw ideas for how we can help (as individuals or as a community) to reduce flooding or its impacts.

**Hint: Think about things people or communities might do to slow down rainwater or keep rivers cleaner, both in the countryside and in towns, to get you started with your ideas.*



Nature-based 'soft engineering' actions

- As a community we could get prepared, signing up for flood alerts, think about emergency planning, key contacts, sand bags storage and flood kits.
- Plant trees, create ponds/wetlands to soak up rain and slow down the water.
- Keep drains and gutters clear so heavy rain can drain away.
- Save water at home to reduce pressure on drains and sewers.

Built or 'hard engineering' actions

- Build dams to store water and release it slowly.
- Construct flood defence walls or embankments to keep water away from homes and businesses.

River Velocity Investigation

Date: ___ / ___ / ___



Investigation:

Location:	Team Name:	Weather:
-----------	------------	----------

	Time 1 (seconds)	Time 2 (seconds)	Time 3 (seconds)	Time 4 (seconds)	Time 5 (seconds)	Average Time (seconds)	Velocity (m/s)
Site A							
Site B							
Site C							
Site D							

Velocity
River velocity is how fast the water is moving in the direction the river is flowing.

The distance the float was measured over...
= _____ metres

Distance _____
Average time _____
Velocity =



Image: Colin McLean

Rising Rivers: Glossary

Meander

A curve or bend in a river that makes the water travel more distance and slow down.

River catchment

The area of land where rainwater drains into the same river.

Leaky Barrier

A barrier made from deadwood that slows and spreads water but still lets some through.

Wetland

A waterlogged area with plants and shallow pools that stores extra rainwater.

Runoff

Rainwater that moves over the ground because it can't soak into the soil.

Velocity

How fast something is moving and the direction it's going.

Reservoir

A large man-made lake that stores water behind a dam to release when needed.

You can use this page for reference or print & cut out the rectangles for a plenary game of mix and match.

Re-meander

Putting the curves and bends back into a river that has been straightened.

Channel

The main path a river flows through, usually shaped by water over time.

Peatland

A type of wetland made of moss and peat that soaks up rainwater like a sponge.

Native Woodland

Trees that have grown in the UK for thousands of years and suit local conditions. They soak up rain and hold soil together.

Flooding

When too much water builds up in one place and spreads onto land that is usually dry.

Embankment

A raised wall or bank built beside a river to stop water spilling out onto land.

Drainage Grate

A metal grid in the ground that rainwater flows into so it can drain away through pipes.

Curriculum Links

Curriculum for Excellence

CfE Experiences & Outcomes	Rising Rivers
MNU 2-10a: Practical investigation involving timed events	X
SCN 2-02b: Benefits of plants to society	X
SOC 2-07b: Impacts of natural disasters on people and landscape	X
SOC 2-08a: Environmental impact of human activity	X
SOC 2-08b: Evaluate a proposed land use development	X
HWB 2-23a: Working with others	X
TCH 2-09a: Using design skills to solve problems/construct models	X

National Curriculum

KS2	Rising Rivers
SCIENCE	
Yr. 4: Potential threats of changing environments	X
GEOGRAPHY	
Describe and understand key aspects of physical geography	X
Explore human geography including land use, settlement, and environmental impact	X
Use fieldwork to observe, record and present features in the local area	X
DESIGN & TECHNOLOGY	
Select and use a range of materials	X
Generate, develop, model, and communicate ideas	X
Evaluate their own designs and those of others	X
MATHEMATICS	
Measure, compare and record units such as time distance and speed	X

Sustainable Development Goals (SDG)

Rising Rivers



This lesson supports **SDG 15** by highlighting the role of woodlands, wetlands, and peatland in protecting landscapes and storing water.



This lesson supports **SDG 11** as learners consider how natural and nature inspired flood defences protect people, places and infrastructure from flooding.



This lesson supports **SDG 13** as learners explore how flooding is affected by extreme weather and climate change, and how nature-based solutions can help communities adapt.



Project Delivery Partners



Project Funders



Co-funded by the European Union



FALLAGO
ENVIRONMENT
FUND



NORTHUMBRIAN
WATER *living water*

Federated
Hermes

Tweed Forum: At the heart of land and water management on Tweed.

Destination Tweed: Destination Tweed is a unique project which aims to celebrate and share the nature, history and stories of the River Tweed and deliver significant economic, environmental, educational and social benefits to the South of Scotland and North Northumberland.

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

Original illustrations by Louise Kirby. Graphic Design by Gavin Reid Design.
Some pages in this pack incorporate licensed stock images sourced on Canva.