Flood management on the River Severn: teachers' notes

This resource has been created to support student knowledge and understanding of:

- the movement of water through the drainage basin
- river processes and landforms of the upper and middle course of the River Severn
- methods of river management used on the River Severn in the towns of Newtown and Shrewsbury.

The resource also reinforces a number of geographical skills including:

- selection and presentation of data in suitable graphical form
- ascribing meaning to interpret evidence in photographs
- the annotation of photographs
- decision making.

Background information

Newtown is a small town on the River Severn in Powys. Catastrophic floods in 1960 and 1964 did significant damage to properties in the town centre. In 1965, Newtown was designated as a new town. This released funds for a major flood prevention scheme which included flood walls and embankments. The investment enabled the new town to attract industrial investment.

Shrewsbury is the county town of Shropshire. The town centre is sited within a meander of the River Severn. Shrewsbury has a long history of flooding, with floods causing significant damage roughly once every 10 years. The last major flood happened in November to December 2000. In the mid-1990s the National Rivers Authority (which was replaced by the Environment Agency) proposed a flood management scheme which was rejected due to the perceived visual impact of flood walls in the town. However, attitudes changed after the floods of 2000 and a scheme consisting of flood walls and demountable barriers was designed and installed in 2002. Details of the Frankwell Flood Alleviation Scheme can be found in the Environment Agency pdf that accompanies these materials. There have been times when the river levels have risen since, and the most significant of these events was in the winter of 2019-2020 which is when the photos in resources 9, 10 and 11 were taken. The following extract, from a report by Shrewsbury and Atcham Council, describes the impact of flooding in February 2020:

'In Shrewsbury the Environment Agency deployed every phase of the town's flood defences, protecting areas around Frankwell and Abbey Foregate. However other areas of the town which are not protected by formal defences, such as Coleham, Smithfield Road, Chester St and Coton Hill, flooded for the first time since the 2000 event. Flooding occurred to both businesses and residential properties in the town centre and had a significant impact on transport infrastructure due to the closure of many roads and rail lines into Shrewsbury. The flooding also had a significant financial impact on town centre shops and businesses.'

https://shropshire.gov.uk

The student resources

The student resources are listed below in the sequence in which they are designed to be used. These materials are suitable for use in face-to-face teaching or in a blended learning environment.

File name	File type	What the resource is: how it might be used
1 Course of River Severn	PowerPoint	This presentation describes the course of the River Severn and it also describes the main features and landforms of the river. The River Severn is the UK's longest river. The upper course (upstream of Shrewsbury) collects water from a catchment area of 2,500km^2 so the town has between 6 and 12 hours warning before flood water arrives. This presentation and the third one (Drainage basin) provide students with this important context so they can understand how flood water arrives in the town. The information about landforms, including a diagram showing how the waterfall, Water-break-its-neck, is formed by differential rates of erosion, may be used as part of this scheme of work or taught separately at another time.
2 Describing the course of the River Severn	Word doc	An activity that supports student map reading skills. Students should use this document with the map of the course of the River Severn in the PowerPoint presentation. Basic map reading skills such as use of compass points and the scale line are used. A closed procedure is used to describe the course of the River Severn – providing the students with a model answer. Students then have the opportunity to base their own extended prose on this model when they write their own description of the course of the River Wye.
3 Drainage basin	PowerPoint	A simple animated presentation that provides visual definitions for key terms associated with the drainage basin.
4 Glossary of key words	Word doc	An activity which can be used to check that students understand the key terms used to describe the drainage basin.
5 Rainfall patterns	Word doc	An activity designed to support student graphicacy skills. The GCSE (9–1) qualifications require that students not only know how to present data accurately in graphical form, they must also understand how to select a graph that is suitable for the data and how graphs can be adapted or amended in order to make them more effective. This activity is designed to introduce these graphical skills at a level that is appropriate for KS3. The activity also reinforces the concept of water movement through the drainage basin. Precipitation is in the order of 350% greater near the source of the River Severn than in Shrewsbury.

6 Flood risk on the River Severn	Word doc	Students need to access the FLOOD ASSIST website (https://floodassist.co.uk/resources/flood-risk) when using this document. Students will get an impression of the scale of the flooding issue by studying various locations on the River Severn between Llanidloes in Powys and Ironbridge in Shropshire. Some of these locations are at high risk of a significant area of the floodplain being flooded. However, they need to appreciate that, in a natural river, the river channel is only one part of the river system. At times of heavy rain, it is normal for the floodplain to store excess water. This only becomes an issue where flooding conflicts with human activities – especially urban development.
7 Introduction to river management	PowerPoint	A presentation that introduces four main responses to river flooding. The Environment Agency design and implement hard engineering solutions where flooding poses a threat to human life or economic activity, i.e. hard engineering schemes involving flood walls and embankments tend only to be used in built-up areas such as Newtown and Shrewsbury. These schemes are big projects that take a lot of time, planning and cost to build. Environment Agency experts, project managers and local stakeholders look at many options before making decisions for the flood challenges in each location. Soft engineering schemes, which work with natural processes to store flood water and slow the flow of flood water downstream are the preferred option in the upper catchment.
8 How embankments work	PowerPoint	A simple animated presentation that explains how embankments work. Embankments prevent flood water from spreading across the floodplain – a place that naturally stores and slows the flow of flood water. Consequently, embankments are only used where they can protect lives and properties from flood water.
9 Flood management in Shrewsbury	PowerPoint	A case study of flood management in Shrewsbury which covers land use zoning, adaptation of buildings, flood walls and demountable barriers. The presentation can be used to prompt a discussion about why some locations in Shrewsbury are protected from flood water by flood walls and demountable barriers while other locations, such as the Frankwell car park or the Quarry Park, are not.
10 Layers of inference	PowerPoint	Layers of inference is a useful technique for students to use when interpreting photos of geographical features and events. The technique draws a distinction between a description of what can be seen in the photo and what can be inferred from this evidence. For example, a photo may show sandbags and a wooden board placed at the foot of a door. What can be inferred is that a flood has been predicted and that the resident has seen/heard the flood warning and decided to protect the property. Layers of inference can also be used to take the interpretation further. By asking 'What doesn't the photo tell me?' the student is forced to think about other evidence/data that needs to be collected. For example, in the case of the photo of the

		door with the sandbags: how much time did the resident have to make preparations, or how big was the flood, or did this temporary defence protect the property? Layers of inference is a useful technique because it encourages students to move beyond a simple description of what they can see and begin to ascribe meaning to images. Six images have been provided. These could all be used in one activity or they could be used separately in starter or plenary activities.
11 Annotation activity	PowerPoint	Annotation is an activity that consolidates the layers of inference activity described above. Instead of simply labelling images with words that describe what can be seen in an image, annotation means that students must interpret what can be seen. The connectives, such as 'so', 'because', 'therefore', and 'this means that' are all useful ways of encouraging students to extend their prose and convert simple description into interpretation. Five images have been provided. These could all be used in one activity or they could be used separately in starter or plenary activities.
12 Flood risk in Shrewsbury	Word doc	This final activity is a virtual fieldtrip to 12 sites in Shrewsbury that are prone to flood risk. The flood risk for each site is given in a table in the document. These have been found using the FLOOD ASSIST website: https://floodassist.co.uk/resources/flood-risk In some cases, two flood risks are given. This is because the What3words location is within one level of flood risk but places nearby, which have higher/lower flood risk, can vary at each site. Land use changes as does the level of flood protection. For example, site 2 has no flood protection. The land use here is the Frankwell car park. The university buildings, which can be seen if the view is spun around, are protected by flood walls and demountable barriers. The purpose of the fieldtrip is to reinforce the idea that not all locations within an urban environment need flood defences. The fieldtrip ends with a decision-making exercise: for the students to choose one or two sites where extra flood defences would be useful. Site 10 is one such site. This residential area includes historic buildings close to the river as well as new apartments. A flood wall can be seen a few metres further downstream but the residential area at the northern end of the footbridge has no flood defences.

Useful websites

https://what3words.com – This site should be used to identify precise locations during a virtual fieldtrip.

https://floodassist.co.uk/resources/flood-risk – The flood risk map can be used by students to assess flood risk on the River Severn at various locations between Llanidloes in Powys and Ironbridge in Shropshire.

https://floodassist.co.uk/river-data – This site provides river gauge data. Use it to view river levels for the River Severn – use the search engine to find data for 'Welsh Bridge'. The photos of the River Severn in flood used in the presentations were taken on 21/01/2021.

https://www.peoplescollection.wales/discover/query/Newtown%20flood%201960 – Images of the River Severn at flood in Newtown.

https://player.bfi.org.uk/free/film/watch-newtown-disastrous-floods-of-1960-1960-online – Video of the 1960 flood in Newtown.

https://timeforgeography.co.uk/videos_list/rivers/river-management-hard-engineering/

https://timeforgeography.co.uk/videos_list/rivers/problems-hard-engineering-and-softer-alternatives/