TOPIC: Peatland & Water Quality SCIENCES	P5-7
This lesson will use real data collected by Crichton Carbon Centre from a river in Dumfries and Galloway in 2022/23. The conclusions that pupils will make from the data and graphs they make are the conclusions that CCC and our partners The University of Glasgow made which were published in a research paper and therefore have real world meaning. Some concepts in this lesson may require more time to explain: pH and Dissolved soil. Teachers may wish to use pH papers, easily available online, to test various items first, or conduct a simple experiment dissolving salt or sugar in warm water.	
Literacy, numeracy, health and wellbeing: **MNU 2-20a, MNU 2-20b**	SCN2-20b SCIENCE SKILLS: Analyses, interprets and evaluates scientific findings, Presents scientific findings, Skills and attributes of scientifically literate citizens
Learning Intentions: **We are learning to use graphs to communicate data** **We are learning to draw conclusions from data** Success Criteria I can create a bar chart to display data I can create a graph with labelled axis, scales, and input the data correctly I can find and select the correct information from the graph to answer questions I can draw conclusions from data and apply them to real life	
Key words **Peatlands** **Water Quality** **pH – Acidic/Acidity** **Dissolved** **Decomposed/Decomposition**	Other – SDGs, UNCRC, Digital skills 

TEACHER NOTES

See the pH video playlist here, if the pH powerpoint videos do not work: https://youtube.com/playlist?list=PLIh-ytNdBoMxkayHO7kyIG0BBsBrAdpeA&si=dvGFdOmmyex79vOp

Peatlands

- Peatlands are a type of wetland
- Peat is a soil that is very carbon rich, because a healthy peatland is waterlogged, and so dead plants don't fully decompose like they would in your compost.
- Because of this, more organic matter is made than breaks down, so the peat grows – at a rate of 1cm every 10 years! In some areas of Dumfries and Galloway, our peatland is 8 or 9m deep, meaning it has been forming for 8000 or 9000 years (since the last ice age).

Peatlands & Water Quality

- Peatlands make water cleaner by trapping and breaking down nutrients and chemicals from, for example, fertilisers.
- Damaged or drained peatlands cannot do this as effectively, and water quality will decline. There will be changes in the pH (the water will become more acidic), dissolved organic matter (peat soils will be washed into the water – this is why many Scottish rivers and streams appear brown) and temperature (the water will become darker because of the dissolved organic matter, and so absorb more heat).
- This can affect not just the water in the peatlands but also the rivers and lakes that the water flows into. By keeping peatlands healthy we can keep water cleaner.

pH

- pH is a measurement of how acidic, neutral, or alkaline something is.
- Freshwater is typically around pH 7, or neutral.
- Peatlands are naturally acidic, and if they are damaged, will cause nearby streams and rivers to become more acidic.
- Acidic waters can damage or kill fish, insects, and plants.

Dissolved Organic Carbon (Dissolved Soil)

- DOC is a measure of organic material, such as broken-down plants and animals that have dissolved in water.
- Peatlands are usually connected to large water systems, so DOC from the peatland can flow into rivers and water affecting water quality. By measuring DOC, we can gain insights into the health of peatlands, and assess their impact on surrounding water systems.
- Excessively high levels of DOC is not good for water quality. It can cause water to appear brown which can impact light penetration and increase temperature, and it can reduce oxygen levels in the water impacting fish and invertebrates.

The Data & Graphs

- We collected water samples from 10 water courses that are connected to peatlands and then we measured their pH levels and dissolved organic carbon in a laboratory to assess the impacts of peatlands on water quality.
- We found that lower pH levels (more acidic) were linked to higher dissolved organic carbon levels.
- From this, we concluded that damaged peatlands affect water quality significantly because the DOC washed into the watercourses caused ‘acid flushes’ which are short but severe periods of low acidity that is acidic enough to kill fish and insects.
- The graphs that the pupils will make will be bar charts.