

# Teacher Resource Guide: How Spongy Is Your School? Rainfall and Flooding Observation

Welcome to your resource guide and this exciting new project!

Over the course of this project your students will:

## Record rainfall using a rain gauge

1. Map landcover types surrounding your school
2. Determine soil types and soil permeability to discover 'sponginess' (optional)
3. Create a water risk map
4. Create a flood-resilient 'spongy' school proposal

The most impressive flood-resilient 'spongy' school plan wins a coveted GLOBE prize!

## This document is your resource package. It includes:

- Rain gauge installation and reading guidelines
- Task guidance and worksheets
- Suggested videos, helpful links, and report/PowerPoint templates

We know there is A LOT in this guide, so please feel encouraged to get creative and **use what you like and leave what you don't like!** You will probably not be able to complete all the activities in this guide, so choose which activities you prefer and earmark others for future lessons.

You could also include examples of local climate change adaptation measures, flood events, and climate change risks. If you wish, extend this project and continue measuring rainfall on a weekly basis into the spring.

If you have any questions, don't hesitate to reach out to Maya Fields and the GLOBE Ireland Team at [globe@eeu.antaisce.org](mailto:globe@eeu.antaisce.org) / [mgryestenfields@eeu.antaisce.org](mailto:mgryestenfields@eeu.antaisce.org)

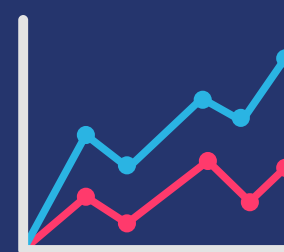
Remember that **sharing** your project observations, analysis, and results as you go **on social media** is a great way to **spread awareness** about the challenges surrounding flood resilience in a built environment!

Tag us @GlobalIreland if you do using the hashtags:  
**#howspomyismyschool #floodresilience**

**Step 1: Receive a graph of satellite-collected precipitation history from the past 23 years at your school's location!**

**How?** Send an email with your school's latitude and longitude to [dorian.w.janney@nasa.gov](mailto:dorian.w.janney@nasa.gov) and she will send your 23-year graph of rainfall

Learn more about this activity [here](#)



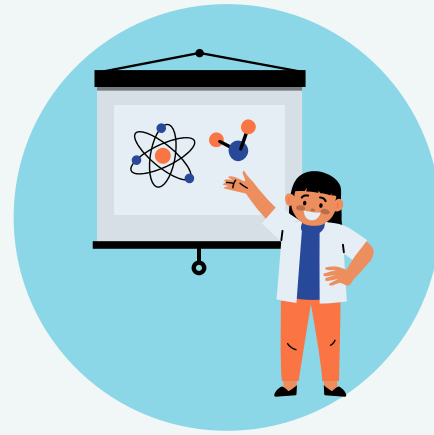
# WEBINARS, EVENTS, AND DEADLINES



Monday, January 22nd  
Expert Webinar  
10-11 am

Hear from **flood resilience experts** and get inspired to create rainwater management solutions at school.

[Register here](#)



Feb 7th and 8th  
Student Presentations

In small presentation groups of 5-6 schools per session (3-4 presenters per school) your students will present their experience, findings, and spongy school rainfall solutions!

Local experts will give your students advice to bring with them into finalising their project work.



Project  
Submission  
February 23rd

Submit your project at [globe@eeu.antisce.org](mailto:globe@eeu.antisce.org)

You choose the format! Video, report, science poster, artwork. Any way you want to share what you did, what you found, and your rainfall resilience school design!

## INSTALLING YOUR RAIN GAUGE

- Ensure you have an open space
- Mount the rain gauge holder onto a suitable rod/stick (diameter approx. 26 mm, approx. 1m tall). If it does not fit, you can use duct tape to secure it.
- Place the bottom of the rod firmly in open ground.
- Place the rain gauge in the holder.
- If you do not have a 1m long stick or rod, you could use strong duct tape or a cable tie to tie the rain gauge holder to a fence. See the image examples below.
- Calibration: Try to ensure that your rain gauge is level, you could use a carpenter's level across the top of the funnel of the gauge.

If in doubt, check the GLOBE Precipitation Protocol E-Training [here](#).



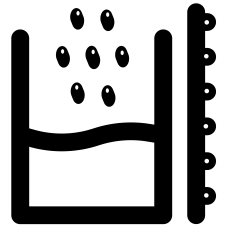


# HOW SPONGY IS YOUR SCHOOL INVESTIGATION IN 10 STEPS



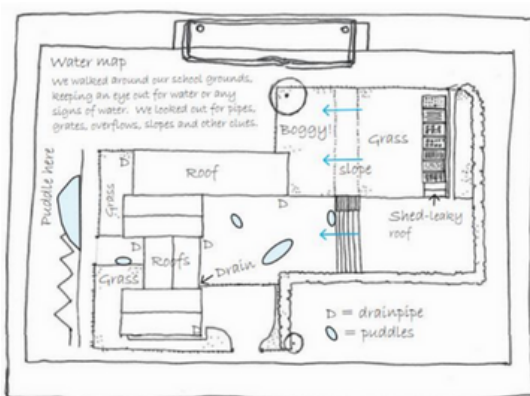
## 1 Record Rainfall Daily

Check your rain gauge between 11-12 daily and write down your readings on:



- 1) Your **Classroom Observation Chart**
- 2) Daily: Submit measurements in the GLOBE App or Browser. Click [here](#)

## 2 Create a Rainfall Site Inventory Map



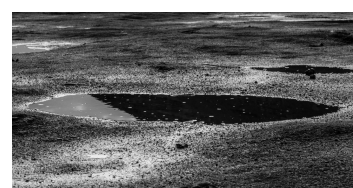
Draw a basic map of your school or use a satellite image printed from Google Maps. Circle drain pipes, drains, and slopes. See example [here](#).  
**Click here to complete the site checklist**

## 3 Puddle/Flood Watch



Look out for & map:

- Puddles/pooling of water around school
- News of local flooding
- The size or growth of rivers/streams

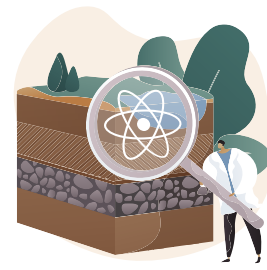


On heavy rainfall days, go outside to note down puddles, water accumulation zones, or drain overflows. You can also notice water circulation patterns. **Circle this on your drawn map**, or your satellite school map.

## 4 Follow and Compare with Local Weather Forecasts

You can follow local weather forecasts [here](#) at wow.met.ie

## 5 [Optional] Spongy Soil Investigation



Complete a simple and fun soil type identification activity and permeable space test of different soils around your school. [Click here and here for worksheets](#).  
You can also learn how to complete a Soil Moisture Observation [here](#).

NOTE: The type of soil you have around at your school and the amount of moisture it can or cannot hold impacts how likely your local area is to flood!

## 6 Investigate Flood Risk in Your Community



(Optional)

**Go on a spongy neighbourhood walk!**

Use the Land Cover Classification Chart [here](#) or re-do the [checklist](#) for your area.

Find out where you are on your cities flood risk maps!

## 7 Investigate Sustainable Urban Drainage Solutions



Watch the videos and **study your nature-based solutions poster** to learn which solutions could be suitable for your school or your neighbourhood.

## 8 Analyse, Design and SHARE your Spongy School Proposal



Use the site analysis worksheet, the Nature-Based Solutions Cards, and the SWOT analysis worksheet to choose solutions for your dream spongy school - rainfall resilient- school design. **See example.**

## AFTER RESULTS AND ANALYSIS



**1** **SHARE** your findings and get expert feedback Feb 8th / 9th

**Present your work in progress** during the slot you will be allocated. You will hear from 6 other schools during the hour and get suggestions and feedback for getting your solutions implemented.



**2** **Choose one solution, make an action plan and start working towards it!**

Choose one solution you think is the most suitable. **Create a step-wise plan for how this could be implemented in the spring.** Who's support would you need? What resources/funding? Write a **proposal or charter** for your school board.



**3** **Submit your project to the GLOBE Ireland 23/24 project competition**

Choose how you want to share your findings. You could write up a report, create a presentation, create a video, a blog, a poem, etc. \*include examples of nature-based solutions being implemented in your community!



# Your 5 PowerPoint Lessons

[Click](#) on the heading to access the ppt



[LESSON 1 \(50 MIN\)](#)  
[CLICK HERE](#)



Why Study Rainfall and Flooding?  
+  
How? Intro to the Study Steps



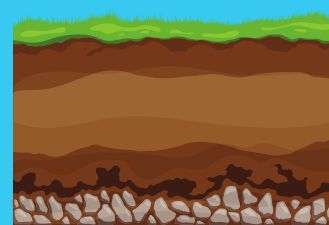
[LESSON 2 \(35 MIN\)](#)  
[CLICK HERE](#)



Rainfall in the Irish Context:  
How much is a lot of rain?



[LESSON 3 \(50MIN\)](#)  
[CLICK HERE](#)



Soil & 'Spongy'  
Materials



[LESSON 4 \(45 MIN\)](#)  
[CLICK HERE](#)



Understanding  
Nature-based Solutions and  
Flood Resilience



[LESSON 5 \(45 MIN\)](#)  
[CLICK HERE](#)



How to Make a Project?  
Results Presentation Tips

NOTE: Lessons may be longer or shorter than the indicated duration if you choose to do the hands on activities during the lesson or not.



[Click here](#) to access all the lessons in one place

## Project Reporting Templates

You can use the project reporting templates, or get creative and make your own !

All project outputs (reports/posters/blogs/articles/videos etc.) must be submitted to GLOBE latest **February 22nd**.

Presentations of results and plans will be held on February 7th and 8th.

[Click here](#) for the project reporting  
template

[Click here](#) for the project powerpoint template

[Click here](#) for the science poster template

[Click here](#) for Photo journalism advice

[Click here](#) for How to create a video YRE  
guidance

[Click here](#) for Writing tips





# HANDS-ON ACTIVITIES



## 1. Daily- Measure Rainfall and Record pH

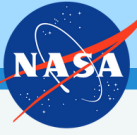
Record Your Rain Gauge Readings On:

- 1) Your Classroom Observation Chart.
- 2) Record them in the [GLOBE App or Browser](#).
- 3) Submit your weekly observations on the [GLOBE Ireland Rainfall and Flooding Recorder here](#).



[Click here](#) for the Classroom Observation Chart PDF

[Click here](#) to daily report your results to NASA scientists OR use the Observer App.



## 3. [OPTIONAL]: Investigate water retention and permeability of school surfaces and soils!

Complete a simple and fun soil type identification activity and permeable space test of different surfaces and soils around your school.

[Click here](#) to learn how to complete the **GLOBE Soil Moisture Protocol** and try it at school!

[Click here](#) for Soil Type and Infiltration Worksheet

[Click here for Pour Water Activity](#): Discover where your most and least spongy spot is at school!



## 2. Draw a Map and Create your Site Inventory



Draw a basic map of your school and/or print a satellite image of your school grounds. Circle drain pipes, drains and slopes. See the example [here](#), and **complete the checklist here**.

Add to the map during the project when you notice areas where puddles or drainage issues frequently occur. Spot these WHILE it's raining!

[Click here](#) to for the Site Inventory Worksheet.

[Click here](#) for How to Make a Map Guidance

## 4. [Optional] Land Cover - Water Walk

Using the [GLOBE Land Cover Classification Chart](#) determine what types of land cover are dominant in your school community. *What impact does the land cover around your school have on your level of flood risk?*

[Click here](#) for Land Cover Walk Worksheet.



## 5. Nature-Based Solutions Discuss & Decide Activities

Based on your site inventory and your weekly puddle/pooling observations, discuss and decide:

*What spongy school solutions are suitable for your school? Where could you put them? Why there?*

[Click here](#) for Site Analysis Worksheet

[Click here](#) for the SWOT Worksheet

[Click here](#) for Nature-Based Solutions Cards

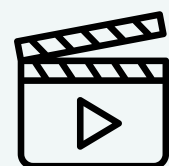


## ADDITIONAL ACTIVITY OPTIONS

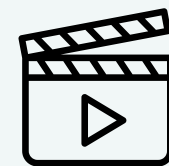
[Model a rain garden worksheet. Click here](#)

[Rainfall Resilience Math. Click here](#)

[Climate Smart. Click here](#)



## VIDEO LIBRARY



Watch: Short 10-12min video examples of climate change adaptation and nature-based solutions in practice

CLIMATE SMART: HAS SHORT WORKSHOPS ABOUT FLOODING IN IRELAND. [CLICK HERE](#).

NATURE-BASED SOLUTIONS VIDEO 1. [WATCH HERE](#)

FLOOD RISK MANAGEMENT NEW YORK. [WATCH HERE](#)

RIVERS AND FLOOD RESILIENCE [CLICK HERE](#)

NATURE-BASED SOLUTIONS VIDEO 2. [WATCH HERE](#)

NATURE-BASED SOLUTIONS IN THE NETHERLANDS. [WATCH HERE](#)

[RTE RAIN GARDENS IN DUBLIN. WATCH HERE](#)

WHAT IS CITY RESILIENCE? [WATCH HERE](#)

WHAT HAPPENS TO RAIN AFTER IT FALLS? [WATCH HERE](#)

[OPW IRELAND, A NOTE FROM THE FLOOD RISK MANAGEMENT UNIT. CLICK HERE](#)

FLOOD RISK MANAGEMENT IN BEIJING. [WATCH HERE](#).

HYDROMETEOROLOGIST IN MET ÉIREANN'S FLOOD FORECAST DIVISION, MATT ROBERTS. [WATCH HERE](#)

[NATURE-BASED SOLUTIONS IN IRELAND, LAWPRO. WATCH HERE](#)

[NATURE-BASED SOLUTIONS FOR NATURAL FLOOD MANAGEMENT. CLICK HERE](#)



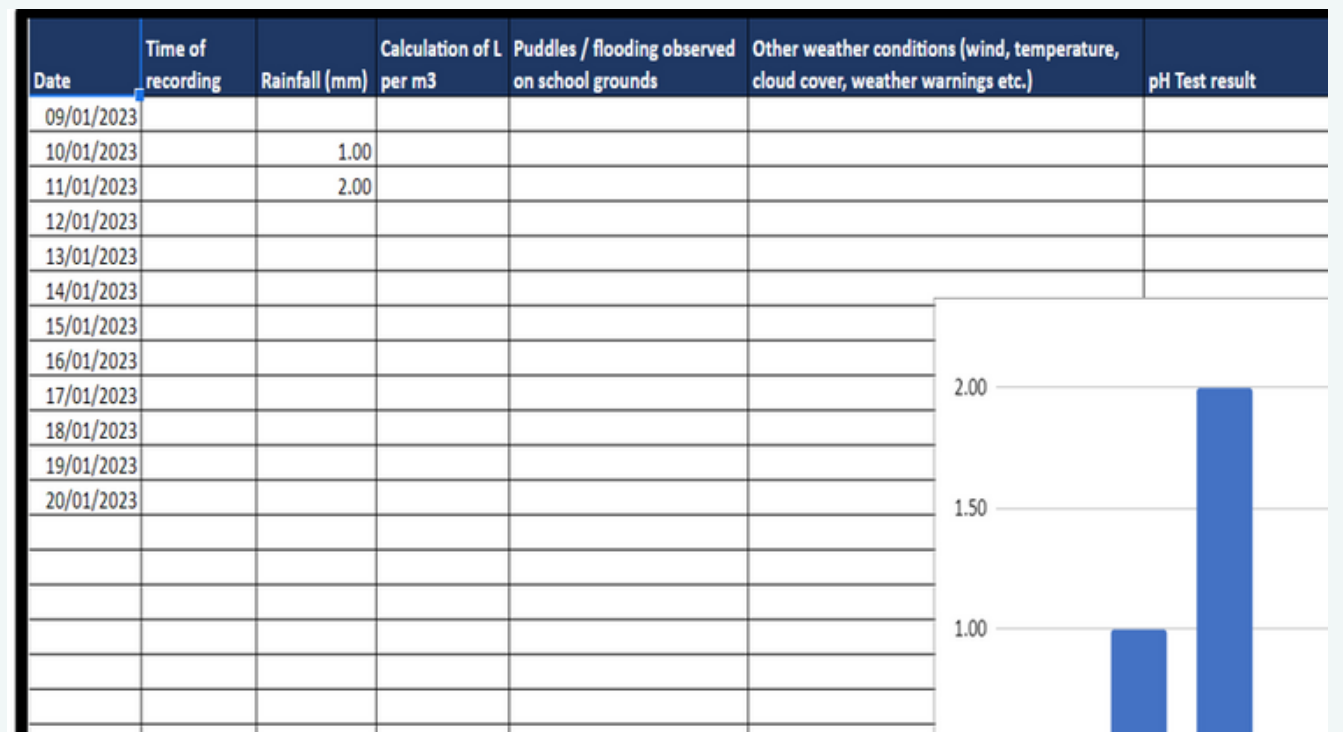
# What Does It All Mean? Analysing Your Findings

[Click here](#) to download your graph creation excel spreadsheet

### Put your rainfall observations in context

Compare with average rainfall measurements in your country in January 2023

[VIEW HERE For Ireland](#)



Reading: Chapter 3, 4 and 5  
Guide to implementing Nature-Based Sustainable Urban Drainage Solutions in Ireland

[Read here](#)

### Research flood risk in your area based on your local flood risk maps.

What is your greatest flood risk source?

Is it Fluvial, Pluvial, or Coastal?

In Ireland, that is the OPW climate change scenario maps.

[VIEW HERE](#)

## GUIDES TO IMPLEMENTING A NATURE-BASED SOLUTION AT SCHOOL

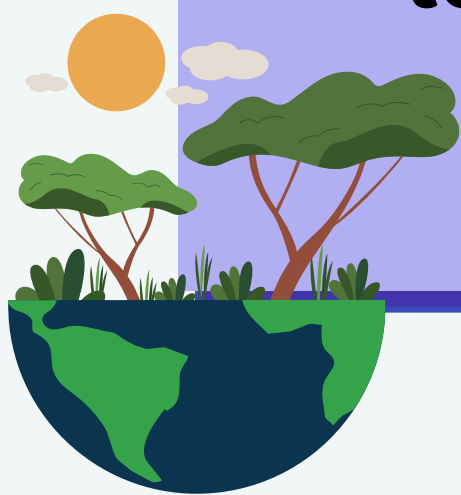


View interactive rainfall-resilient school design [here](#).

Interested in implementing a rain garden, bioswale, mini pond or green roof?

[Click here](#)

to learn more about what it takes and find step-by-step guidance





# PROJECT FEEDBACK LINKS

Your ideas and feedback mean a lot to us!

When you get to the end of the project, please send us your project reflections.

It is important for students to reflect on their learnings. As such, please make sure they fill out a version of the student reflection sheet before they finish the project.

[Student project reflection link](#)  
[CLICK HERE](#)

[Teacher project reflection link](#)  
[CLICK HERE](#)

[Student project reflection printable version](#)  
[CLICK HERE](#)

## ACCESS ADDITIONAL EDUCATIONAL MATERIALS AND RESOURCES:

Dublin City Council Nature-Based Solutions Guidance.  
[Click here](#)

How to complete a GLOBE Programme soil Moisture observation

[CLICK HERE](#)

[Climate Smart handbook:](#)  
[Find here](#)

Storm Water Management Lesson Plan Booklet

[CLICK HERE](#)

Images of rain gardens

[CLICK HERE](#)

[GLOBE E-Training: Protocol eTraining -](#)

[CLICK HERE](#)

[NASA Kids Rainfall, Weather and Climate: Precipitation Education](#)  
[CLICK HERE](#)

TELL YOUR WATER STORY

NASA GPM MISSION

[CLICK HERE](#)

[MORE activities about planning nature-based solutions at school](#)

[VIEW HERE](#)



# Competencies and skills developed by participation

## 01 Scientific and Math skills



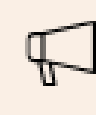
Making a prediction, asking questions, making some hypotheses, following a standardized procedure, recording data, using an app, analyzing

## 02 Team work



Collaboration/teamwork, active listening, learning from peers and experts, taking action/citizenships

## 03 Communication skills



Communicating in a clear and engaging manner, being creative, calling people in to act positively for nature

## 04 Nature connection & well-being



Developing a habit of going outdoors, tuning in with your senses, getting to know and appreciate your local environment

## 05 Climate Literacy for Adaptation



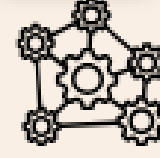
Developing understanding of local climate risks and solutions to adapt to climate impacts

## 06 Critical Thinking Competencies



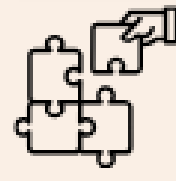
By discussing the pro's con's, strengths, weaknesses, opportunities and threats to implementing your solutions students develop critical thinking competencies

## 07 Systems thinking competencies



By debating and brainstorming the many potential benefits or challenges associated with the different nature-based solutions students will learn to apply interdisciplinary knowledge to see connections between e.g. societal, individual and natural wellbeing

## 07 Integrated problem solving competencies



By investigating the problems of water management, rainfall conservation, and flood risk on site followed by the development of solutions for school grounds, students build integrated problem-solving competencies



These competencies reflect UNESCO's defined KEY COMPETENCIES FOR SUSTAINABLE DEVELOPMENT



# Links with the Sustainable Development Goals





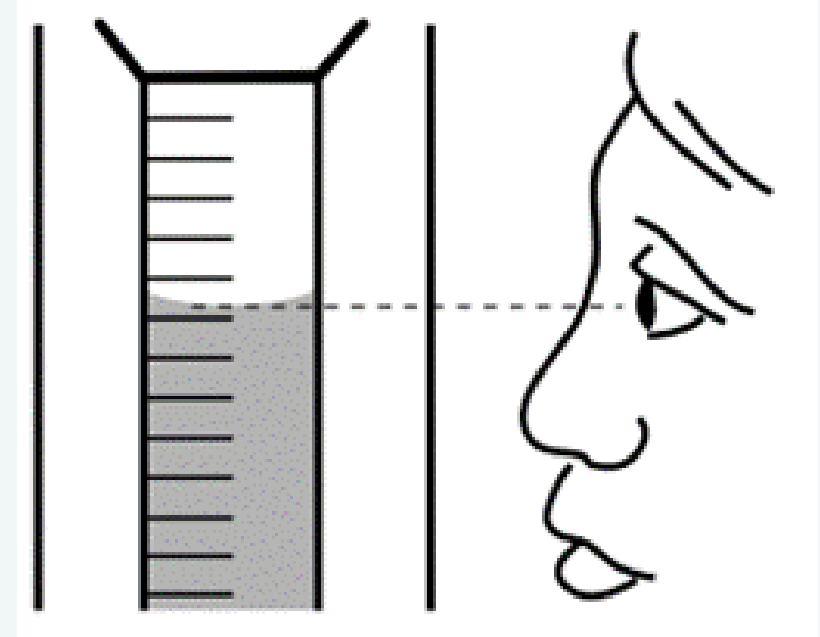


# IN CASE YOU MISSED IT.. GUIDANCE FOR MAKING YOUR RAINFALL MEASUREMENTS:

## How to Read the Rain Gauge

- 1) Read the level of the water in your rain gauge daily; be sure your eyes are level with the water in the measuring tube.
- 2) Try to take your reading at the same time of day at solar noon (you can google when solar noon is).
- 3) Each graduation mark means 1mm or 1 litre per m<sup>2</sup>
- 4) To record precipitation for a longer period of time, turn the revolving ring and continue adding new readings to the previous reading. The arrow on the back serves as a marking.
- 5) If there is no water in the rain gauge report 0.0 mm.
- 6) If there is less than 0.5 mm, record "T" for trace.
- 7) If you spill any water before measuring the amount of rain, record "M" for missing as the amount.
- 8) Write your readings on your *observation chart in the classroom, report them to GLOBE on the Observer App/browser AND report weekly to the GLOBE Ireland Rainfall and Flooding recorder*
- 9) Solid precipitation (snow/ice) must be thawed in order to determine the correct amount.

Important: Do not forget to empty the rain gauge after every reading !



## Step 3: Report your results- GLOBE Observer- Data Recording Details

**\*\*Remember:** It may look complicated- but we promise you can call us any time with any problems. After one or two recording days, it will be second nature!

**Step 1) Log in here or on your phone app using your Teacher Account Info**

**Step 2) Click on 'new observation'**

**Step 3) Click 'Atmosphere'**

**Step 4) Check 'Precipitation'**

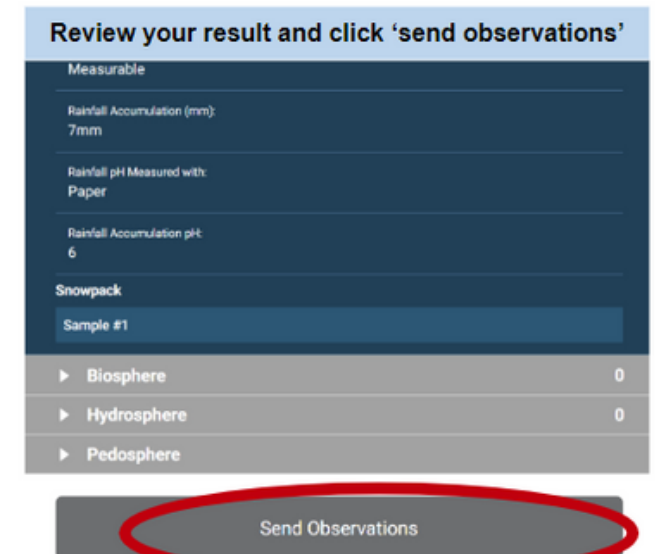
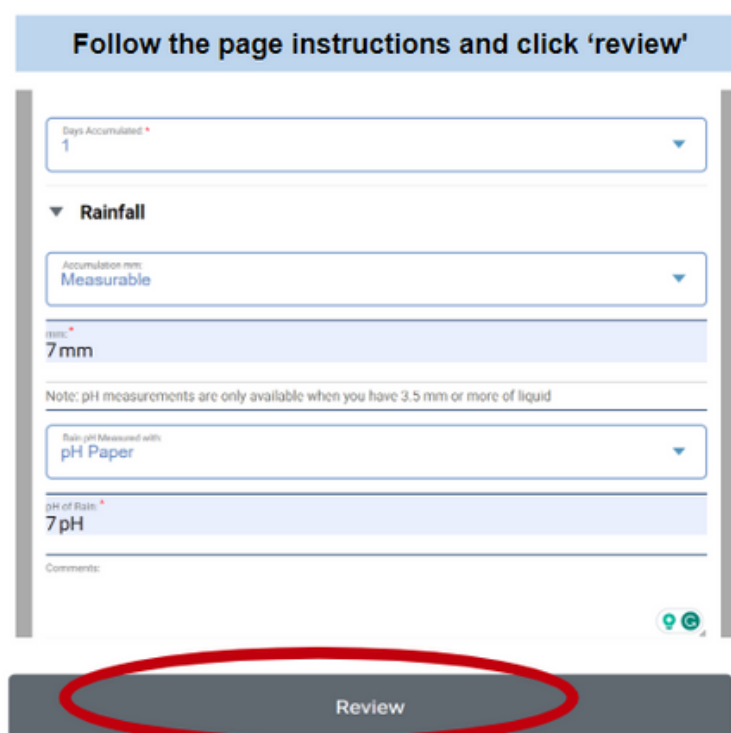
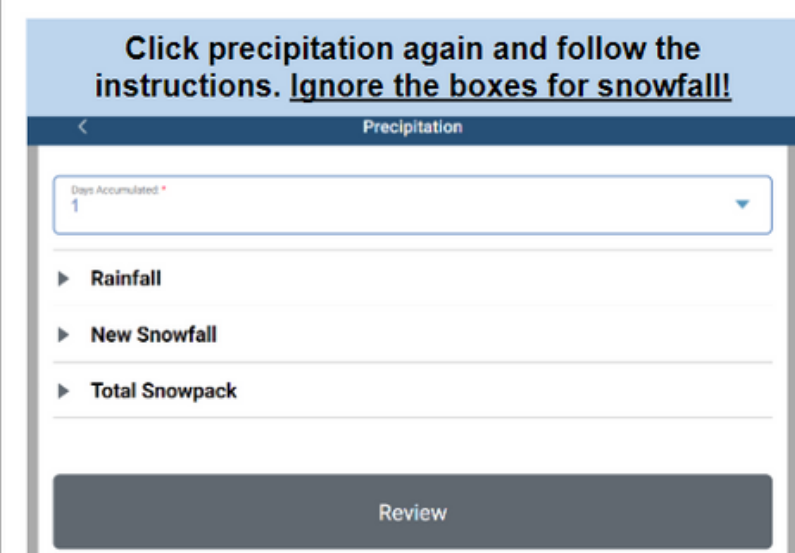
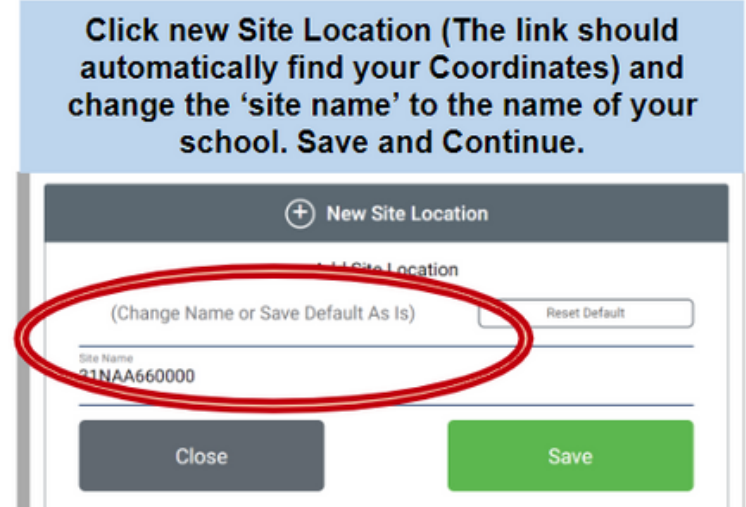
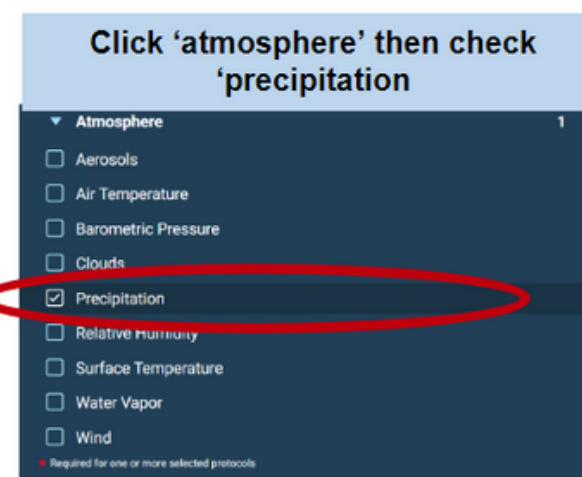
**Step 5) Click 'Continue'**

**Step 6) Click 'New Site Location' and insert the name of your school as the Site Name**

**Step 7) Check local date and time is correct. Then Click 'Precipitation'**

**Step 8) Insert how many days since your last rainfall recording (1 or 2 depending on if it's after the weekend or not)**

**Step 9) Follow the instructions to insert mm recorded and if relevant the pH**



[Click here to report rainfall measurements on the GLOBE observer browser](#)

# [Optional] How to read the pH of rainwater

The PH of rainwater is an important indication of air pollution. Rainwater is naturally acidic, but in some areas, it can be more acidic due to air pollutants such as  $\text{NO}_2$  or  $\text{SO}_2$ . Acidic rainwater is a hazard to both the built environment and soil and plant health. For this reason, the GLOBE Programme's official Precipitation Protocol suggests students test the pH of the rainwater when they take their daily readings.

[Click here](#) to watch a video about acidic rain water.

## How to do a pH reading of rainwater:

- Pour the rainwater from your rain gauge into a sampling jar and cover it for the pH measurement.
- Inside the classroom use a pH strip or another instrument to take a pH reading.
- Write the value on your observation chart.

### How to use a pH Strip:

- Dip a test strip into your sample. Just a few seconds of exposure will suffice. The different indicator bars on the paper will begin changing colour within a few moments.
- Compare the test strip with the colour chart that came with the paper. The colour(s) on the chart should match the colour(s) of your test strip. The chart should correlate colour patterns to pH levels.



## About the pH scale:

pH is typically measured on a scale of 0 to 14 (though substances can be far beyond that range). Neutral substances rate close to 7, acidic ones below 7, and alkaline substances are above 7.

The pH scale is logarithmic, meaning that differences of a single integer represent a tenfold difference in acidity or alkalinity. For instance, a substance that has a pH of 2 is actually 10 times more acidic than one with a pH of 3 and 100 times more acidic than a substance with a pH of 4. The scale functions similarly for alkaline substances, with 1 integer representing a tenfold difference in alkalinity.

Pure water should have a pH of 7, though common tap water has a pH between 6 and 5.5. Highly acidic water (water with a low pH) is more likely to dissolve toxic chemicals. These can contaminate the water and make it unsafe for human consumption.

