

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:

1. Record rainfall using a rain gauge
2. Map land cover surrounding your school
3. Investigate soil types and soil permeability to discover 'sponginess' (optional)
4. Create a water risk map
5. Create a flood-resilient 'spongy' school proposal

The most impressive '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.

The most important thing is to get outside, record rainfall, make a map of pooling/puddles, and **have fun!** The rest is up to you!

You could 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 on globe@eeu.antaisce.org / 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 @GlobeIreland if you do using the hashtags:
#howspongyismyschool #slowtheflow

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 and she will send your 23-year graph of rainfall

Learn more about this activity [here](#)

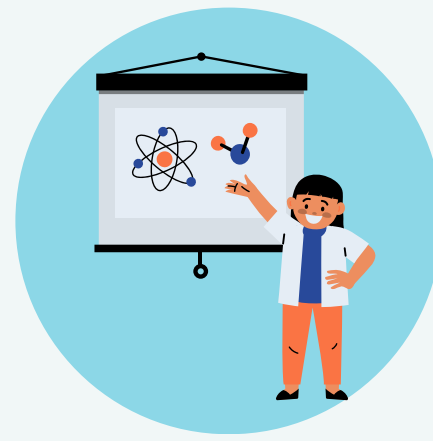
WEBINARS, EVENTS, AND DEADLINES



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

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 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.

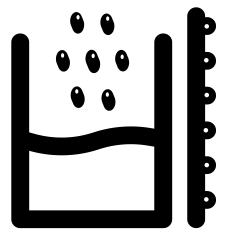


If in doubt, check the GLOBE Precipitation Protocol E-Training [here](#).

HOW SPONGY IS YOUR SCHOOL INVESTIGATION IN 10 STEPS



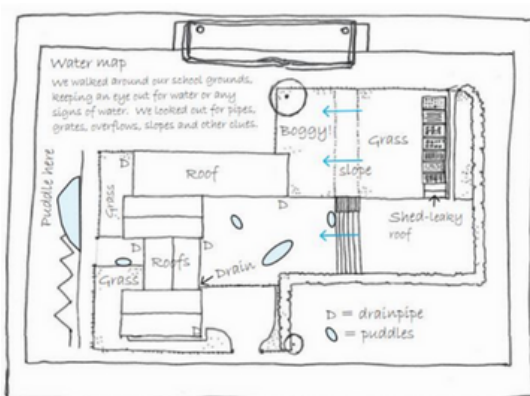
1 Record Rainfall Daily



Check your rain gauge at solar noon- that is btw 11-12 daily and write down your readings on:

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

2 Create a Rainfall Site 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

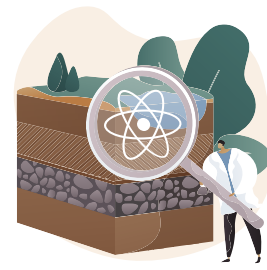


On heavy rainfall days, go outside to note down puddles, water accumulation zones, or drain overflows. You can also notice water circulation patterns. **Circle this on your drawn map**, or your satellite school map.

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](#).

NOTE: The type of soil you have around school 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.

Check where you are on the your countries flood risk maps!

7 Learn about 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/or the [SWOT analysis worksheet](#) to choose solutions for your dream spongy school design. [See example](#).

AFTER RESULTS AND ANALYSIS



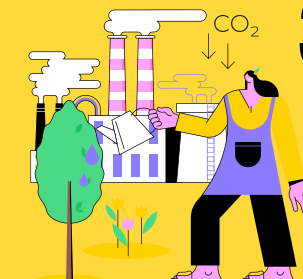
1 SHARE your findings and get expert feedback Feb 8th / 9th

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, 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 your investigation



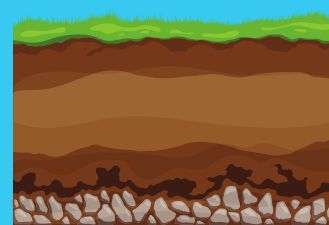
[LESSON 2 \(45 MIN\)](#)
[CLICK HERE](#)



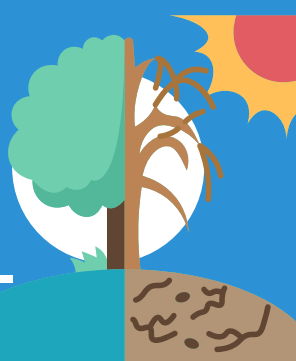
Rainfall in the Irish Context:
How Much is a Lot?



[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 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 for a song,
poem, story etc



HANDS-ON ACTIVITIES

1. Daily- Measure Rainfall and Record pH

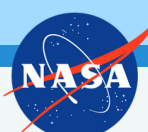
Record your rain gauge readings on:



- 1) Your Classroom Observation Chart.
- 2) Record them in the [GLOBE App or Browser](#).

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

[Click here to Report your Results to NASA scientists OR use the Observer App.](#)



2. Draw a Map and Create your Site Inventory Map



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 Spongy School Checklist.](#)

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

3. [OPTIONAL]: Fun Simple Soil Experiments to Add Texture to Your Study



Complete a simple and fun soil type investigation and walk around to discover where your most spongy surface at school is!

[Click here for the Soil Type Discovery Worksheet](#)

[Click here for What is my Most Spongy Spot Activity](#)

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.
Answer: 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 spongy school checklist 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 rainfall solutions worksheet](#)

[Click here for the Which Solution & Why activity?](#)

[Click here for nature-based solutions cards](#)



VIDEO LIBRARY

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

[SUDS NOT FLOODS WATCH HERE](#)

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

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

[RIVERS AND FLOOD RESILIENCE CLICK HERE](#)

[WHERE DOES THE RAIN GO? WATCH HERE](#)

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

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

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

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

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

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

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

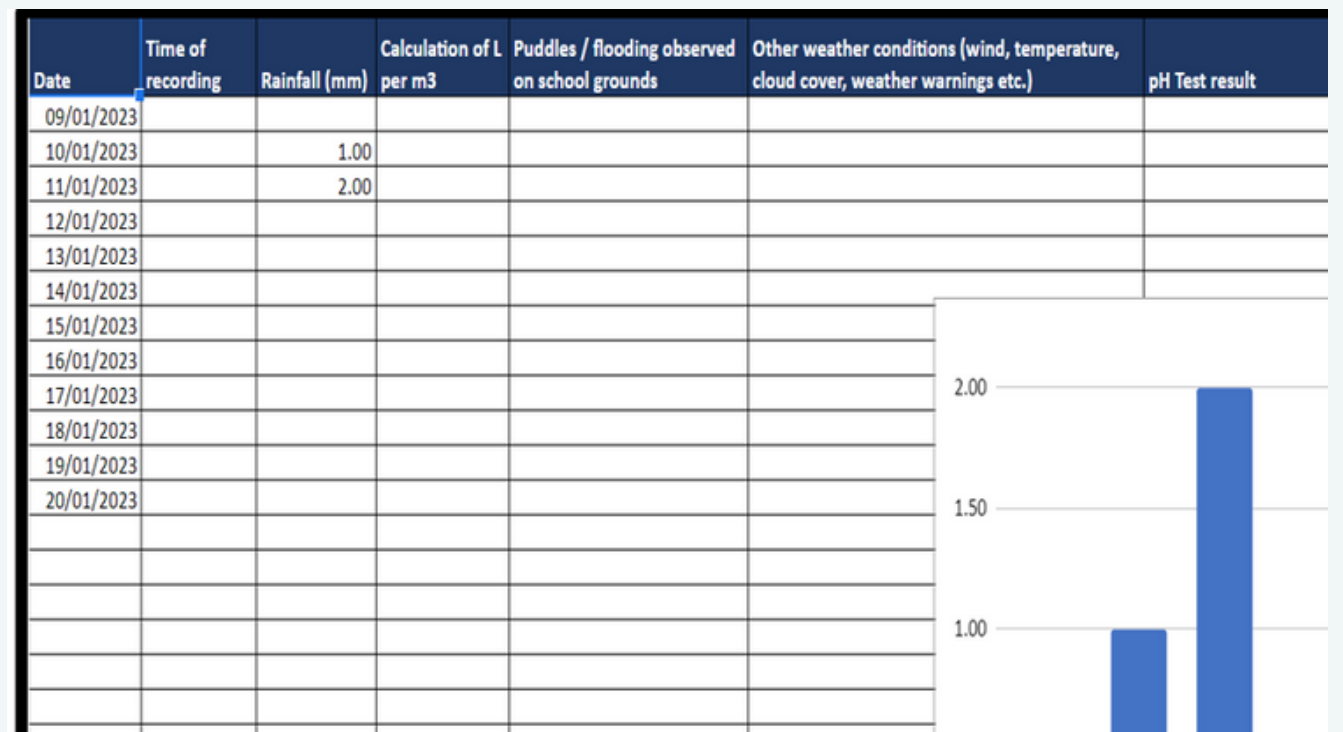


What Does It All Mean? Analysing Your Findings

[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

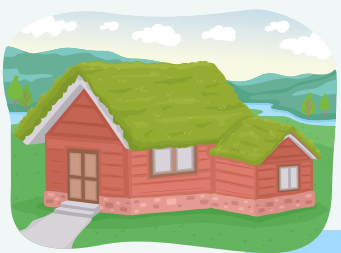
[VIEW HERE](#)



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?

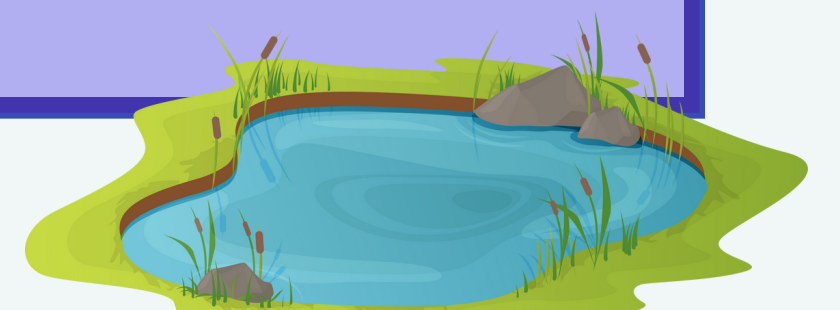
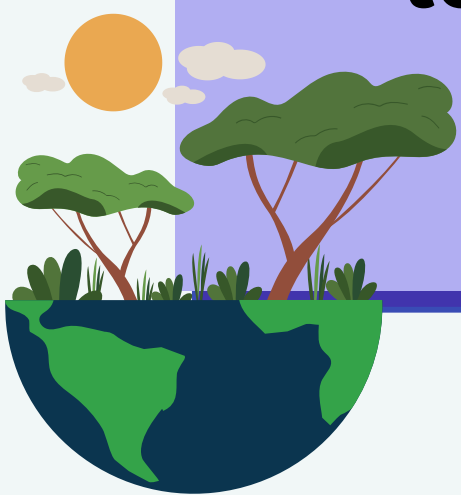
GUIDES TO IMPLEMENTING A NATURE-BASED SOLUTION AT SCHOOL



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](#)

MORE HELPFUL EDUCATIONAL MATERIALS AND RESOURCES:

Cloud Booklet
[CLICK HERE](#)

[LEARNING MORE
ABOUT SOIL](#)
[ELEMENTARY
GLOBE ACTIVITIES](#)

[Climate
Smart
handbook:
Find here](#)

Soil Treasure
Hunt
[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



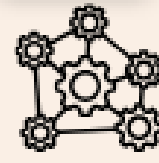
Developing understanding of local climate risks and solutions to adapt to climate impacts

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

4 QUALITY EDUCATION



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



THE GLOBAL GOALS

Links with the Sustainable Development Goals



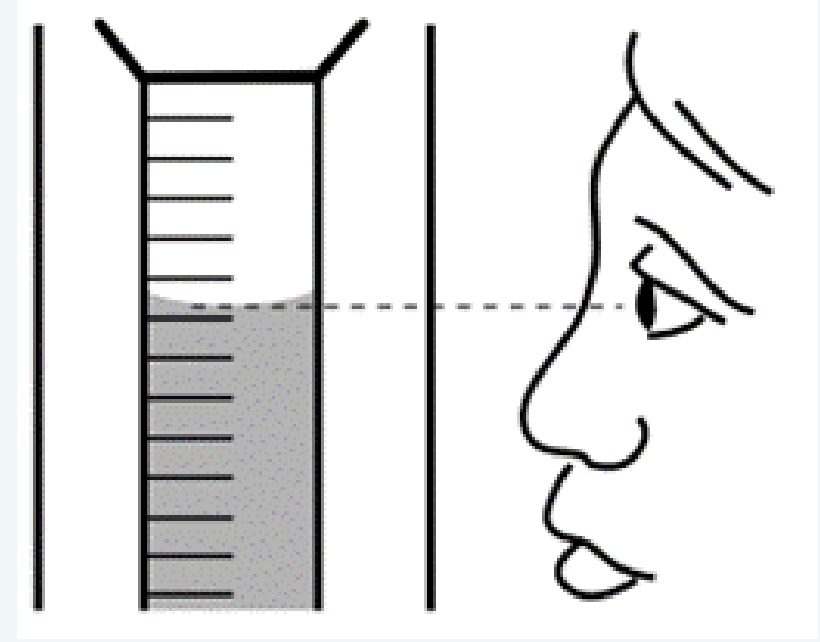


IN CASE YOU MISSED IT.. GUIDANCE FOR MAKING YOUR RAINFALL MEASUREMENTS:

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, between 11 and 13
- 3) Each graduation mark means 1mm or 1 litre per m²
- 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 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'

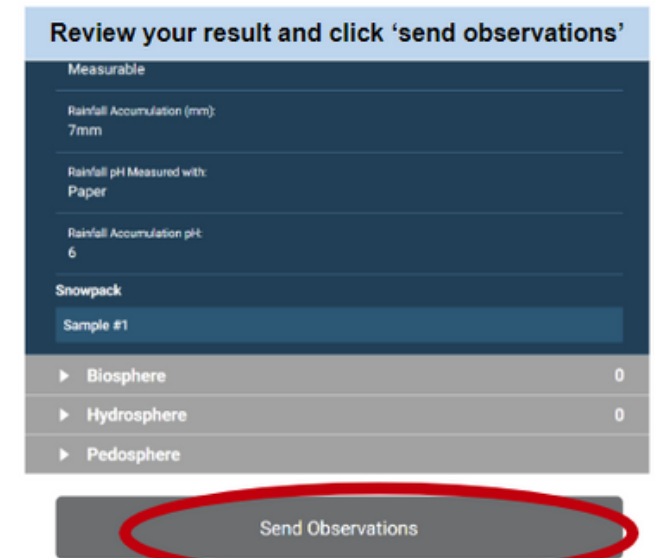
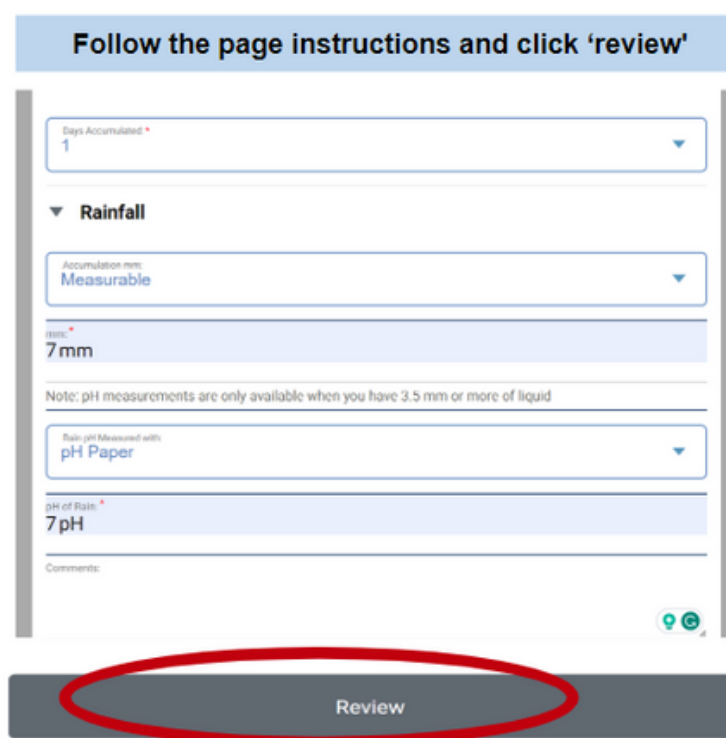
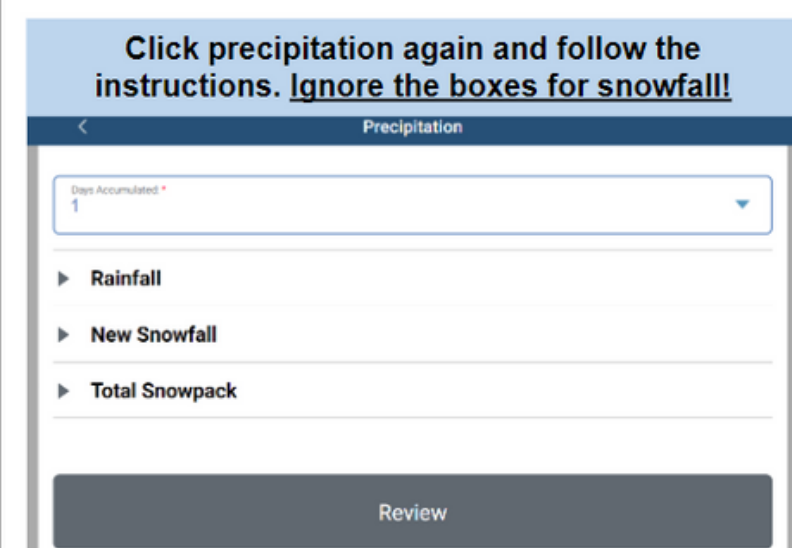
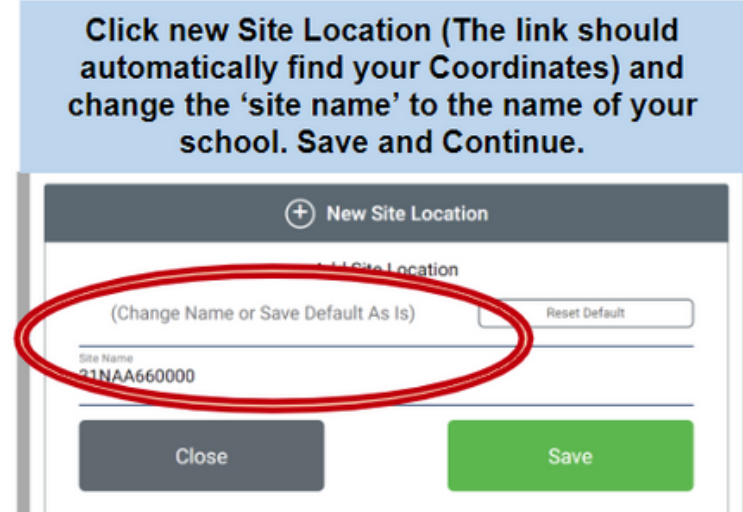
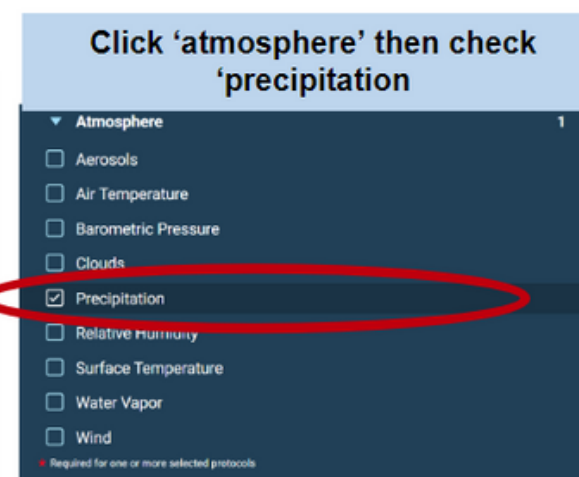
Step 5) Click 'Continue'

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 NO_2 or 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 rainwater.

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 actually 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.

