

Using Eco-Schools Scotland for the development of STEM skills



Introduction

The Eco-Schools Scotland programme is a great context for application and development of STEM skills. The programme supports pupil-led enquiry, evaluation and measurement of activities identified through the Environmental Review, Action Plan and Measuring Elements.

This resource will support you to use the Eco-Schools Seven Element process as a vehicle to deliver Curriculum for Excellence's experiences, outcomes and benchmarks.

This document suggests ideas you may want to consider exploring through your identified Eco-Schools Scotland Topics and United Nations Sustainable Development Goal. Empower pupils by allowing them to make the decisions on how to measure their progress as much as possible, to develop organisational and leadership skills. Generating and presenting data complements a variety of skills-related experiences and outcomes. Data collection, processing and presentation should be appropriate to the level at which the pupils are working, and using the benchmarks to assure the quality of the work is recommended.



This resource will help you to explore how you might plan to include STEM skills within your Action Plan to ensure that you don't miss opportunities to demonstrate your progress. For example, in measuring the impact of an action, you will need to take baseline measurements at the start of the journey. Don't end up in a situation where you have done some wonderful work but can't measure the impact because you didn't measure the 'before'!

Measuring for Eco-Schools can be used for the following purposes



To demonstrate young peoples' learning and show the curricular links that have been made.



Skills

To develop STEM skills.



Assess

To determine whether there is an a requirement for action.



Measure

To measure the impact of an action.

Litter



Read more about the Litter Topic on our website

<https://www.keepsotlandbeautiful.org/sustainable-development-education/eco-schools/ten-topics/litter/>

Target:

Reduce the volume of packaging waste brought into school/nursery (and therefore reduce litter).

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|--|---|---|
| Campaign to reduce snacking that have packaging in favour of healthy alternatives that don't e.g. fruit. | <p>Before campaign, count the number of snacks with and without packaging. Repeat afterwards.</p> <p>The mass of packaging could also be determined, to incorporate additional skills.</p> <p>Improving the quality: Collect data on several occasions and calculate averages.</p> | <p>Tally chart.</p> <p>Table.</p> <p>Bar graph/pictogram</p> <p>Calculations e.g. overall reduction, means, % increase/decrease in packaging, mass of litter per pupil, ratios of categories.</p> | <p>Document the types of snacks used and assess whether there are changes in the proportions of healthy snacks.</p> <p>Incorporate waste packaging into the graphs.</p> <p>Summarise the results to enhance communication skills.</p> |

Litter

Target:

Reduce littering in school grounds/local park/marine litter/other.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|---|--|---|
| Hold an anti-litter campaign. | <p>Collect litter: record mass and/or number of items of litter.</p> <p>Improving the quality: Collect data on several occasions and calculate averages.</p> <p>Improving skills: categorise types of litter and include in measurements.</p> | <p>Tally chart.</p> <p>Table.</p> <p>Bar graph/pictogram.</p> <p>Calculations e.g. overall reduction, means, % increase/decrease in packaging, mass of litter per pupil, ratios of categories.</p> | <p>Generate actions to target particular types of litter.</p> <p>Involve litter monitors in a daily traffic lighting system and measure its impact.</p> |
| Assess whether the location of the bins/recycling facilities is adequate. | <p>Photograph litter hot spots and current facilities.</p> <p>Improving the quality: map rather than photograph.</p> | <p>Photos or map of:</p> <p>Current bin facilities, litter hotspots/proposed location of alternative bin facilities. Could be done as overlays.</p> | <p>Create a display of the findings.</p> <p>Survey opinion on the new bin arrangements and display quotes or graph positive versus negative feedback.</p> <p>Calculate the efficiency of any changes as mass litter collected/£</p> |

Target:

Raise awareness of plastic pollution.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|---|--|---|
| As part of a campaign to end nurdle pollution, take part in a nurdle survey. | <p>Photograph/count/estimate nurdle numbers or mass and locations.</p> <p>Improving the quality: Map nurdle locations and abundance on beach.</p> <p>Improving skills: Use ecology/geography approaches such as a transect of the beach using quadrats,</p> | <p>Display quantities of nurdles as traffic lights.</p> <p>Pictorial presentation e.g. same spot of the beach over a year.</p> <p>Map abundance of nurdles over the beach.</p> | <p>Integrate observations of weather or time/tide and survey on multiple occasions.</p> <p>Fulfil citizen science obligations by uploading data to FIDRA's Nurdle Hunt survey - https://www.nurdlehunt.org.uk/.</p> <p>Make a display using the nurdles (risk assessment must consider exposure to chemicals absorbed by the nurdles).</p> <p>Make a video to raise awareness.</p> |

Waste Minimisation



Read more about the Waste Minimisation Topic on our website <https://www.keepsotland-beautiful.org/sustainable-development-education/eco-schools/ten-topics/waste-minimisation/>

Target:

Minimise consumption of plastics by encouraging pupils to purchase alternatives.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|--|---|---|
| Pupils pledge to switch a regular purchase to a more zero-waste alternative e.g. plastic toothbrushes swapped to wooden (and composted), buying toothpaste tabs in a refillable bottle or buying a hair soap bar rather than plastic shampoo bottle. | Count pledges after a time determine how many stuck to their pledge. Improving the quality: Find the mass of waste saved by having each pupil weigh the items that would have been landfill/recycled. Improving skills: introduce creativity in art and design by making art with the waste before making the pledges e.g. a mosaic of plastic water bottle tops. | Categorise pledges as those which were followed or not or develop another criterion: ■ Show the actual pledges in a display. ■ Tally the categories. ■ Chart/graph the categories. | Find out how much water is used in the manufacturing of the products and calculate whether or not water has been conserved by your actions. |

The above ideas can be adjusted to address similar activities such as:

- Increasing recycling of paper.
- Reducing single-use drinks containers.

Waste Minimisation

Target:

Minimise waste from popular products by encouraging manufacturers to adopt more environmentally friendly options.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|---|--|---|
| Gather evidence and develop persuasive writing skills by writing to companies describing the issue and consequences of the waste from their products. Request an improvement. | <p>Collect litter: Record mass and/or number of items of litter.</p> <p>Improving the quality: Collect data on several occasions and calculate averages.</p> <p>Improving skills: Categorise types of litter and include in measurements.</p> | <p>Tally chart.</p> <p>Present responses as they come in on a responsometer or remove a letter from a 'landfill' section on a display to visualise the impact in reducing waste.</p> <p>Table.</p> <p>Bar graph/pictogram.</p> <p>Calculations e.g. overall improvement in environmental impact score.</p> | <p>Share your result on social media to celebrate companies demonstrating ethical responses to waste management.</p> <p>Is there a relationship between the quality of persuasive language in the pupils' letters and the responses they received?</p> <p>Create a Young Reporters Scotland entry to highlight your findings – https://www.keeptoscotlandbeautiful.org/yrs.</p> |

Target:

Develop STEM skills by applying them to an enterprise challenge.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|---|---|---|
| Use The Plastics Challenge resources at https://practicalaction.org/plastics-challenge to design, create and produce a product made of recycled plastics. | <p>Determine how well the products meet the success criteria and record results using a scoring system of evaluation.</p> <p>Sell the products and measure the profits.</p> <p>Improving motivation: introduce a team building/competitive element.</p> | <p>A table/graph showing scores against success criteria (+/- traffic lights) assessed by teacher/peers/consumers.</p> <p>Use a 'design abacus' for evaluation and display.</p> <p>Have an ongoing bar graph displayed on a monitor, showing near real-time profits and losses.</p> | <p>Submit pupil work for a Crest Discovery award. Further resources - http://discoverylibrary.crestawards.org/#Discovery.</p> <p>The activities could be altered with the aim of reducing consumption of parts by producing replacements using a 3D printer as part of an Advanced Higher project.</p> |

Target:

Educate pupils on the environmental impact of waste and how to minimise the impact.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|---|---|---|
| Deliver a series of (interdisciplinary) lessons on the topic. | Pupils' knowledge and understanding is assessed before and after the lessons through observation and qualitative analysis together with quantitative measurements e.g. through oral or written responses to questions or by scoring correct sorting of waste items into categories. | A teacher's learning journal including self and peer observations. Analysis of assessment data and display as percentage improvement overall or for selected categories. Pupils demonstrate their learning through the production of posters/projects/videos/songs/drama. | Assess volunteer parents' knowledge and understanding to determine influences and impact beyond school. Produce a report on the local authority effectiveness in recycling and waste disposal. |

Target:

Reduce waste by reusing.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|---|--|--|
| Hold a swap shop of pre-loved items or collect donations for a charity shop. | Number of items swapped. Improving the quality: volume of paper/plastic rescued from landfill. | Table. Measure the impact by researching the cost of recycling/disposal of the items and calculating the cost saved to the community. | Instate as a termly/annual event. Find out how much water is used in the manufacturing of the items swapped and calculate the volume of water that has been conserved compared to purchasing new items. Write letters to the council stating the potential costs saved if every school held similar swapping events. |

Global Citizenship

Read more about the Global Citizenship Topic on our website <https://www.keepsotlandbeautiful.org/sustainable-development-education/eco-schools/ten-topics/global-citizenship/>

Target:

Investigate the impact of Climate change on local wildlife.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|--|--|---|
| Investigate whether 'Nature's calendar is running early' (relating to climate change). | <p>Observe the appearance of annual changes in particular species, relating to the climate over a four week period. Record whether they are earlier or later than expected using these resources:</p> <p>The Climate Coalition's Noticing Change worksheet for older pupils https://www.theclimatecoalition.org/noticingchange/.</p> <p>The Woodland Trust's Natures Calendar Resource for older pupils https://naturescalendar.woodlandtrust.org.uk/what-we-record-and-why/species-we-record/.</p> <p>Improving quality: Investigate historic appearance of these changes – https://naturescalendar.woodlandtrust.org.uk/analysis/seasonal-reports/.</p> | <p>Complete a worksheet and display.</p> <p>Graph the number of species appearing early/late/the same as usual.</p> <p>Compare your observations to historic data then calculate and plot information e.g. average number of days early over all species observed.</p> | <p>Make links with another school to compare and contrast data.</p> |

Target:

Compel pupils to assess their moral perspective relating to inequalities.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|---|---|--|
| <p>Deliver a series of lessons on climate justice, technology justice or gender equality.</p> | <p>Collect information on pupils' attitudes to these issues prior to and following the lessons.</p> <p>Improving skills: Have more senior pupils design a survey to assess attitudes. The (anonymous) survey could generate written responses or involve numerical ratings.</p> | <p>Pupils make a photobook to display their learning.</p> <p>Display results of qualitative analysis e.g. quotes or observations regarding the language and insight displayed by pupils.</p> <p>Numerical survey results could be graphed by the class.</p> | <p>Take action on inequalities using STEM and the following resources:</p> <p>Climate Ready Classrooms – www.keepsotlandbeautiful.org/climateready</p> <p>Technology justice – https://practicalaction.org/technology-justice-schools.</p> <p>Gender equality – http://cdn.worldslargestlesson.globalgoals.org/2016/07/Final-Gender-Equality-Lesson-Plan-1.pdf.</p> |

Target:

Encourage citizenship through pupils donating their time.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|---|--|---|
| <p>Facilitate opportunities for pupils to take part in learning opportunities either as a class e.g. maintaining local park gardens/visiting a nursing home or individually e.g. volunteering/mentoring through the Duke of Edinburgh Award.</p> | <p>Collect information on pupils' attitudes to these issues prior to and following the lessons.</p> <p>Improving skills: Have more senior pupils design a survey to assess attitudes. The (anonymous) survey could generate written responses or involve numerical ratings.</p> | <p>Tally chart.</p> <p>Table.</p> <p>Graph to compare contributions from each class/house group/year.</p> <p>Real time graph displayed on a monitor in school.</p> | <p>Aim for a target with prizes.</p> <p>Make personal pledges/targets to continue to fundraise out with school/nursery.</p> |

Global Citizenship

Target:

Measure the impact of fundraising on emotional wellbeing.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|--|---|---|
| Identify a focus for fundraising, ideally pupil led. | <p>Pupils can discuss how taking part might affect how good they feel and could come up with creative ways to measure it (before and after).</p> <p>Responses could be kept private.</p> | <p>It is perhaps too intrusive to quantitatively assess an impact on wellbeing you could consider qualitative options instead.</p> <p>Younger children could write about their experience/make art/drama/music to display their emotions.</p> | <p>Keep a private journal or write a reflective piece on the relationship between actions and wellbeing/ their own experience</p> <p>Make personal pledges/targets to continue to fundraise out with school/nursery</p> |

Target:

Increase understanding of the impacts of climate change.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|--|---|--|
| Investigate how 'climate ready' the local area is. | <p>Take photographs of adapted and unadapted local areas.</p> <p>This resource is useful: Climate ready places https://www.adaptationscotland.org.uk/how-adapt/tools-and-resources/climate-ready-places.</p> <p>Improving the quality: Rate how adapted each area is</p> <p>Improving skills: Complete and display a 'Place Standard Tool' https://www.placestandard.scot/.</p> | <p>Display photographs and categorise as adapted or unadapted areas. Label or traffic light them.</p> <p>Display results of a 'Place Standard Assessment'</p> | <p>Pair with another school and compare your result.</p> |

Food and the environment



Read more about the Food and the Environment Topic on our website <https://www.keepsotlandbeautiful.org/sustainable-development-education/eco-schools/ten-topics/food-and-environment/>

Target:

Reduce lunch hall food waste.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|---|--|--|
| Gather evidence and devise a campaign to reduce food waste. | <p>Measure the mass of food waste prior to and following the campaign.</p> <p>Improving quality:</p> <ul style="list-style-type: none"> ■ Measure on several occasions and calculate averages ■ measure separate categories of waste e.g. from particular meals ■ Lots ideas for high quality monitoring can be found at Love Food Hate Waste - https://www.zerowastescotland.org.uk/sites/default/files/ZWS1054%20LFHW%20Whole%20School%20Pack.pdf. | <p>Table of measurements.</p> <p>A bar graph showing the difference in mass (for each category).</p> <p>Calculations e.g. overall reduction, means, % increase/decrease in mass, mass of food waste per pupil, ratios of categories.</p> | <p>The results of a survey of which school meals are most enjoyed by fellow pupils might also be used to reduce food waste.</p> <p>Investigate where the food waste goes and opportunities for composting in school grounds.</p> |

Food and the Environment

Target:

Generate an appreciation of the requirements for food production.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|--|---|---|
| <p>Grow food e.g. garlic from bulbs, potatoes from seed, bean sprouts from mung beans.</p> <p>Alter potential requirements such as:</p> <ul style="list-style-type: none"> ■ +/- light. ■ +/- carbon dioxide. ■ A range of temperatures. ■ +/- fertiliser or particular nutrients. | <p>Measure or photograph the lengths of root/shoots.</p> <p>Count the number of leaves.</p> <p>Find the mass of the plant/product.</p> <p>Improving skills: Calculate the Harvest Index.</p> | <p>Create a display showing the size of the plant over time.</p> <p>A table showing measurements over time.</p> <p>A line graph showing measurements over time.</p> <p>A bar graph showing the mass at planting versus harvesting or mass of different plants/produce.</p> <p>Plot the Harvest Index for different cultivars.</p> | <p>Turn into an enterprise activity with produce being sold.</p> <p>Make a meal with the produce grown.</p> |

Target:

Use the topic of 'Food miles' to explore environmental and/or social ethics.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|--|--|--|
| <p>Deliver a series of lessons on food miles and Fairtrade.</p> <p>Good resources include Big Picture (https://bigpictureeducation.com/lesson-ideas-food-miles-whats-fair/), Fair Miles (http://pubs.iied.org/pdfs/155161IED.pdf) and Fair Trade (https://www.fairtrade.org.uk/en/what-is-fairtrade/fairtrade-and-sustainability).</p> | <p>Calculate food miles for typical meals suggested by pupils. There are a variety of online calculators available e.g. Climate Choices - http://climatechoices.co.uk/pages/food3.htm.</p> <p>Improving skills: Promote systems thinking by investigating the multiple impacts of buying from abroad (e.g. using Food Connections resources: https://practicalaction.org/europafraction/foodconnections).</p> | <p>Display the sources of ingredients for one meal on a map of the world.</p> <p>Compare different meals in a table/graph.</p> <p>Show learning of the complexities of food miles versus fair miles in a mindmap or other display.</p> | <p>Create meals using locally-sourced ingredients.</p> |

School Grounds

Read more about the School Grounds Topic on our website <https://www.keepsotlandbeautiful.org/sustainable-development-education/eco-schools/ten-topics/school-grounds/>

Target:

Identify aspects of the school grounds that require improvement.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|--|--|---|
| Carry out an audit of the school grounds to include input from all the school community. | Design a survey. You may want to categorise different aspects of school grounds for scoring. A mix of quantitative and qualitative data could be useful. This learning through landscapes resource might inspire – https://www.ltl.org.uk/pdf/LTL-Scottish-Good-Playground1386257083.pdf . Record different current uses of the school grounds. | Present quotes on a display A map of the uses of the grounds, showing the scores of each area from the survey | Use your audit to persuade people to get involved with improvements |

Target:

Improve skills in design/graphic techniques/construction/measuring.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|--|--|---|
| Design/construct something to improve the school grounds e.g. outdoor seating/raised beds/play equipment. | Evaluate skills (self/peer assessment) demonstrated/outdoor seating/raised beds/play equipment produced. | Display evidence of pupil learning such as learning journals/notebooks, photographs. Display pupil evaluations of skills. | Use the skills developed to make improvements beyond school grounds in the local community. |

Target:

Fundraise to purchase playground equipment.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|-------------------------------|---------------------------------|--|
| Plan and carry out a fundraising event/series of events. | Record the profits generated. | Have a running total displayed. | Develop further outreach opportunities with one of the charities you are supporting. |

Transport

Read more about the Transport Topic on our website <https://www.keepsotlandbeautiful.org/sustainable-development-education/eco-schools/ten-topics/transport/>

Target:

Find out how people get to school.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|-------------------------------|--|---|---|
| Carry out a transport survey. | Record the number of people using different categories of transport. Find data on the carbon generated per mile for each mode of transport. | Tally chart. Table. Graph/Pictogram. Calculations including the volume of carbon produced. | Submit data to Sustrans' annual Hands Up Survey – https://www.sustrans.org.uk/scotland/hands-up-scotland-survey . Take part in a Sustrans Big Pedal campaign – https://bigpedal.org.uk/ |

Target:

Suggest eco-friendly alternatives to those pupils currently use.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|--|----------------------------------|--|
| Record journeys and research alternatives. | Map a partner's journey and modes of transport to school and potential alternatives. | Map actual and suggested routes. | Calculate costs involved for each journey. |

Target:

Develop STEM skills.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|---|--|---|
| Use STEM skills to design transport for a real life problem e.g. using this Practical Action resource – https://practicalaction.org/squashed-tomato-challenge-5 . | Take photographs, measure the distance tomatoes are transported and/or how many teams are successful in transporting over a fixed distance. | Create a display with photographs annotated to show the skills demonstrated such as team work and leadership. Table/graph showing distances travelled/ number of groups successful. | Link into 'Global Citizenship' and consider the context suggested in the Practical Action resource. |

Health and Wellbeing



Read more about the Health and Wellbeing Topic on our website <https://www.keepsotland-beautiful.org/sustainable-development-education/eco-schools/ten-topics/health-and-wellbeing/>

Target:

Investigate the air quality around the school.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|--|---|---|
| Survey indicators of ammonia and nitrogen oxides using Opal Airsurvey – https://www.opalexplornature.org/airsurvey . | Density of different lichens on trees. Number of Tar spots per leaf on Sycamore. Improving skills: Measure the number of spots per cm ³ . | Interpret results using 'What do your results mean?' – https://www.opalexplornature.org/sites/default/files/7/image/AIR%2016pp%20booklet.pdf Write a report on your finding. | Submit the data to the Opal website as a Citizen Science activity – https://www.opalexplornature.org/enterresultsairsurvey . |

Health and Wellbeing

Target:

Investigate whether there is a need for more green spaces in and around the school (impact of green space).

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|---|---|--|
| Research the effects of green spaces on wellbeing. | <p>Research literature on attitudes to and exposure to green spaces and the impact on mental health</p> <p>Assess the abundance of green space in your location</p> | <p>Tally positive and negative responses</p> <p>Table of responses</p> <p>Summarise findings as text/graphs</p> | <p>Make recommendations on how to increase the green spaces in your school grounds</p> |

Target:

Investigate whether there is a need for more green spaces in and around the school (abundance of green space).

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|--|---|---|
| Assess the abundance of green space in your location. | <p>Count the number of plants, rooms and/or measure the area.</p> <p>Record the locations of green areas/plants.</p> | <p>Tally chart.</p> <p>Graph to show number of plants in each classroom/department.</p> <p>Calculate average number of plants per room or per m²</p> <p>Map of the green areas/plants.</p> | <p>Make recommendations on how to increase the green space.</p> |

Target:

Identify better ways to spend your time to improve health and wellbeing.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|---|--|--|
| Pupils and staff record how they spend their time. | Journal activities over a week. Improving quality: Categorise activities as positive / negative or physical / sedentary / mentally stimulating. | Pie chart. Graph: Stacked bar for each day. Activities placed on a Venn diagram or diagram showing contributions to physical, social and mental health. Calculations: Ratios, percentage, time. | Combine information to show the 'average' pupil/member of staff. |

Target:

Promote exercise by considering effects on mood.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|--|---|------------------------|
| Pupils moods are assessed following exercise. | Survey mood before and after exercise. Ideas for exercise and survey format are in this Terrific Scientific resource – https://guides.files.bbci.co.uk/terrific-scientific/Exercise_Teacher_Resources_Updated.pdf . | Tally of moods before and after. Graph of number of people with each 'mood'. Describe the feelings generated from exercise. | |

Target:

Enhance skills for work in health-related occupations with lessons on how to measure aspects of health.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|---|---|--|
| Pupils are given lessons on a variety of measurements, how to take them and what the results indicate about health. | Suggestions: peak flow meters, blood pressure monitors and medical thermometers. For more advanced measurements see Nuffield – http://www.nuffieldfoundation.org/applied-science/using-blood-pressure-monitors . | Evidence of learning is the ability to take effective measurements, this could be the actual measurements recorded by pupils or peer assessment feedback or other pupil work. | Invite a health professional to get involved in the lessons. |

Biodiversity



Read more about the Biodiversity Topic on our website <https://www.keepsotlandbeautiful.org/sustainable-development-education/eco-schools/ten-topics/biodiversity/>

Target:

Empower pupils as effective contributors through citizen science activities.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|--|---|------------------------|
| <p>Find out about an environmental issue and generate data using a campaign such as:</p> <p>EDF Energy's What's Under Your Feet campaign – https://jointhepod.org/campaigns/whatsunderyourfeet2018.</p> <p>Invasive species: New Zealand flatworm – https://www.opalexplornature.org/nzflatworm.</p> <p>Opal soil survey – https://www.opalexplornature.org/soilsurvey.</p> | <p>Identifying / counting / weighing / mapping organisms.</p> <p>Improving skills: Incorporate pitfall traps / tullgren funnels / quadrats / tree beating / transect line studies.</p> | <p>Tally chart.</p> <p>Table.</p> <p>Graph to compare years / seasons / areas surveyed.</p> <p>Upload data to the survey.</p> | |

Target:

Increase biodiversity in the school grounds / provide food and habitat for pollinators.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|--|--|---|
| Survey the biodiversity both before and after planting a wildflower meadow. | Identifying / counting / weighing / mapping organisms. Improving skills: Incorporate pitfall traps / tullgren funnels / quadrats / tree beating / transect line studies. | Tally chart. Table. Graph to compare years / seasons / areas surveyed. Upload data to the survey. | Tally chart. Table. Graph to compare years / seasons / areas surveyed. Work with charities to impact beyond the school e.g. On the Verge – https://www.onthevergestirling.com/ . |

Target:

Deliver experiences and outcomes relating to inheritance.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|--|--|--|
| Use biodiversity as a theme to teach 'inheritance'/measuring and units. | Data handling of collected leaves, layers in an onion, petals on a flower, within and between different species, make comparisons. Measurements of tree characteristics on school grounds/local park. | Write a report. Tally chart. Table. Graph or pictogram to compare years / seasons / areas surveyed / species. | Work out the total volume of carbon stored in the tree in your school using the BBC Terrific Scientific resource – https://guides.files.bbci.co.uk/terrific-scientific/Trees_Teacher_Resources_updated.pdf . |

Target:

Develop your school grounds by fundraising and planting native trees.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|---|---|--|
| Work to raise money to contribute to biodiversity through tree planting (eg. Trees for Life or Woodland Trust). | Record the number of hours of participation in fundraising by each pupil and the amount raised or the number of trees afforded. | Tally chart. Table. Graph to compare contributions from each class/house group/year. Real time graph displayed on a monitor in school. | Explore opportunities to plant fruit trees, harvest produce and prepare food with your crop. |

Water



Read more about the Water Topic on our website <https://www.keepsotlandbeautiful.org/sustainable-development-education/eco-schools/ten-topics/water/>

Target:

Implement water saving measures in the school/nursery.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|---|--|------------------------|
| <p>Put hippos in the toilet – http://www.hippo-the-watersaver.co.uk/.</p> | <p>Measure the volume of the hippo to infer the volume of water displaced.</p> <p>Number of times the toilet(s) is (are) flushed each day via a survey.</p> | <p>Display showing the size of the hippo compared to the cistern.</p> <p>Calculations: total volume of water saved, % water saved.</p> <p>Table/graph showing the volume of water used with the hippo compared to if it hadn't been installed.</p> <p>State what the volume of water is equivalent to in a year/10 years etc e.g. a swimming pool.</p> | |

Similar measurements could be made for water saving devices for taps.

Target:

Investigate levels of pollution in a local river or lake.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---------------------|---|--|--|
| Carry out a survey. | <p>Survey animals living in the water, measure pH and observe signs of pollution.</p> <p>Improving quality: Measure a variety of other factors using a water testing kit.</p> | <p>Use Opal resources – https://www.opalexplornature.org/sites/default/files/7/image/WATER%2016pp%20booklet.pdf or the Trent Biotic Index to convert your measurements into a score and interpret them – http://www.nuffieldfoundation.org/applied-science/estimating-environmental-damage-freshwater.</p> <p>Display photos of the organisms you did and didn't find on a display or map of the pond/river.</p> <p>Write a scientific report of the activity, results and conclusions.</p> | <p>Research the causes of any pollution you identify and report on it.</p> |

Target:

Reduce water use by pupils in their daily lives

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|--|---|--|
| Keep a water diary recording how much water you use before and after raising awareness. | <p>Record the number of times various water-consuming activities occurred.</p> <p>Improving skills: calculate the volume of water used using resources giving average values of volumes for each activity e.g. climate choices resource – http://climatechoices.co.uk/docs/water_use.pdf.</p> | <p>Pictograms/graphs</p> <p>Calculations: Total volume of water saved, % water saved.</p> | <p>Enter the Water Explorers programme for a variety of values-linked water saving activities – https://www.waterexplorer.org/.</p> <p>Compare your water usage to that of young people in other countries.</p> |

Water

Target:

Investigate sanitation issues, raise awareness and raise and donate money to improve sanitation.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|--|---|--|
| <p>Explore access to sanitation in a specific country. Consider fundraising for a charity such as Toilet Twinning – https://www.toilettwinning.org/.</p> | <p>Record the number of hours of participation in fundraising by each pupil and the amount raised.</p> | <p>Tally chart. Table. Graph to compare contributions from each class/house group/year. Real time graph displayed on a monitor in school.</p> | <p>Aim for a target with prizes. Make personal pledges/targets to continue to fundraise out with school/nursery.</p> |

Energy

Read more about the Energy Topic on our website <https://www.keepsotlandbeautiful.org/sustainable-development-education/eco-schools/ten-topics/energy/>

Target:

Reduce energy consumption in the school.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|---|--|--|
| Record how much energy is used before and after raising awareness. | Meter readings. % screens on standby / lights on in empty rooms. | Table / graph. Calculations: Energy saved is equivalent to... | Measure the temperature and look for relationships between temperature and energy consumption. Take part in 'Switch it Off Fortnight' – https://jointhepod.org/campaigns/switch-off-fortnight-2018 . |

Target:

Raise awareness and preparedness for green careers.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|---|--|---|
| Carry out investigations using renewable energy science kits such as wind turbines (and fans), a hydro-generator or solar panel. | Measure the voltage generated under varying conditions e.g. wind speed / water speed / light intensity. Improving skills: Make the results more reliable and calculate averages. | Graph. Write a scientific report. Write about the STEM skills developed during the task. | Give a context to renewables e.g. using this Moja Island resource – https://practicalaction.org/moja-island-1 . |

Energy

Target:

Investigate the importance of insulation in saving energy in the home.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|---|---|-----------------------------|---|
| Measure the temperature over time inside a heat box and investigate the impact of insulation. | <p>Temperature following the bulb being switched off, every 10 minutes.</p> <p>Use a thermal camera (sometimes available from the local authority).</p> <p>Improving skills: use a data logger.</p> | <p>Table.</p> <p>Graph.</p> | Investigate which materials make the best insulators. |

Target:

Investigate the capacity of the school grounds for renewable energy generation.

| Activity | Data collection | Processing and presenting | Extension/alternatives |
|--|---|--|---|
| Map appropriate areas on the school grounds for various types of renewable energy. | Measure wind speed, temperature, light intensity and map. | <p>Table.</p> <p>Graph.</p> <p>Wall display with map and data.</p> | Pitch your ideas to school leaders to see if they can be implemented. |



We support the Sustainable Development Goals.

Keep Scotland Beautiful is the charity that provides education initiatives for children, young people and educators which focus on environmental issues to improve understanding and encourage positive action. It's part of our work to make Scotland clean, green and more sustainable.



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