



This document is one of a suite of Factsheets that are part of the support offered to schools and teachers. The Factsheets provide guidance, ideas and link to resources to support your Citizen Science activities. They also contain suggestions for extended learning relating to problem solving, numeracy, geography and social studies. We hope they will provide all the guidance you need to develop lessons to fit with your own curriculum plans. For general enquiries contact – Amanda Malcolm, Citizen Science Coordinator, citizenscience-scotland@tcv.org.uk, 0141 552 5294.

Biodiversity Factsheet

Introduction

Biodiversity can be described as the mix of species in a habitat whose variety and abundance reflect the ecological health and wealth of the site. This can be measured by identifying individual species and counting their numbers or area of coverage at a site. The mix of plants at a site and the management regime of a site often also reflect the wider biodiversity of insects, birds and other animals that can inhabit the site, providing food and shelter for them.

For example, where a site has few plant species, such as a pine forestry plantation or a well mown lawn, there will be few species of insects, birds and small mammals able to live there despite the site being densely planted. Alternatively, where there is a well spaced, mixed species forestry plantation or a lawn where borders have been left uncut and seeded with wildflowers and daisies and other flowers are allowed to come up due to less intensive cutting regimes, much more wildlife will be able to live and thrive.

Certain species can be used as indicators of the health of a habitat from the effects of pollution. These species are sensitive to the chemical changes brought on to exposure to pollutants in the air, water and soil. The very presence or absence from a site can tell scientists a lot about the chemical makeup of the environment around the site.

For example Lichens, which are an organism that is a **mutualistic** relationship between a **fungus** and a **green alga**, live on tree bark and stones. Some lichens are particularly sensitive to chemical compounds that are present in the air due to the use of petrol, diesel and the burning of coal. The mixture of lichens on trees near you can be recorded and the air quality determined from this. These chemical compounds can be harmful to human health so determining the health of your local lichen population can be a good indicator of wider human health issues.

Water too can be affected by chemical pollutants from sewage discharges, factory effluent, road runoff and from pesticides and fertilizers from farming and forestry. If chemicals are spilled into a river it washes

Activity suggestions – [The OPAL lichen survey](#) will take you through the process of recording lichens on trees near you and allow you to input the data you gather into a national survey which will display your results on a map alongside thousands of other survey results that you can view [here](#).

Activity suggestions – [The OPAL water survey](#) will take you through the process of measuring the health of a pond near you and allow you to enter data to the national survey on ponds. Results of your survey along with others done across the country are presented [here](#).

River surveying also use invertebrate larvae that hatch into riverflies. Details on surveying rivers can be found [here](#) but this needs close support and training to ensure that it's done properly. The Riverfly partnership can be contacted through their website and will be happy for you to contact them for further information.

away the evidence of the chemical as it flows. A river can seem clean but may have been poisoned; water samples will bear no trace of the pollutant, long washed downstream. The evidence that something is wrong can come from the biodiversity of the invertebrate community within the river. Invertebrates are small insects and other creatures that live in the water, many as larvae that later hatch into riverflies we see around rivers and ponds. By sampling rivers and counting numbers and species of invertebrates present, scientists can ascertain the long term cleanliness of a river.

General Biodiversity recording

Many organisations, mostly charitable status based, specialise in the measurement of specific groups of plants and animals. These organisations have a network of staff and volunteer specialists who can identify a wide range species in their chosen field. They undertake surveys of sites, recording the diversity of species and report the findings as a management tool to preserve or improve the suitability of the site to increase the biodiversity of their chosen animal group and the associated plants and animals that coexist there. These surveys often require the cooperation of volunteer recorders to ensure the coverage of the site.

Examples of surveying organisations

[Buglife](#)

[Butterfly Conservation](#)

[Bumblebee Conservation Trust](#)

[Whale and Dolphin Society](#)

[Bat Conservation Trust](#)

[Trust Scotland](#)

[Plantlife](#)

[Froglife](#)

[Royal Society for the Protection of Birds](#)

[Forestry Commission](#)

[Woodland](#)

These organisations have Scottish representation providing local resources and support and welcome volunteer surveyors.

Invasive Non Native Species (INNS)

Plants and animals all interact together to create a balanced harmony of coexistence. They compete for space and food in ways that have developed over thousands of years, never over dominating a habitat or a food source to the detriment of their prey or competitors. There have been numerous introductions by humans of new and exotic foreign plants and animals, some deliberately for commercial or aesthetic reasons some by accident. These species do not have the same balance of competition and predation as native species. In some cases this can mean their populations increase rapidly, advancing into new areas rapidly and out competing native species. INNS are regarded as one of the main threats to biodiversity as dozens of newly introduced species advance across our towns and countryside, forcing out or overwhelming native plants and animals. Some INNS plants are now very well spread and their impact is so serious that [new legislation](#) has been brought out to make the release of certain species to be a criminal offence and sets out steps that need to be taken to control existing INNS. You can help us control INNS in your local area by mapping their presence and reporting it to local authority ranger services.

Activity suggestions – contact a local organisation that is planning surveying near your school. Offer to help them with the surveying; this will boost their surveying capacity and give you access to their support and guidance.

Activity suggestions – identify sites which can be accessed easily and safely, with support as needed from sources such as local ranger service, local authority and SNH. Identify data repository from a list of potentials (to be provided by the above support orgs). Use [Non Native Species Symposium](#) (NNSS) resources to identify most common Non Native plant, animal and insect species. Use photocopies of OS maps to record the positions of each INNS species and submit the maps to the identified data repository. As with all biodiversity work, be encouraged to take photos to help verify ID (you will be provided with a list of people/organisations you can contact for expert verification)

By the conclusion of the Citizen Science Project it is anticipated that learners will be able to understand:

- Biodiversity – what it is, why it is important and what it can be used to indicate
- What local organisations record biodiversity and local projects they can become involved in
- What they can do to protect local biodiversity (at home, at their school and in their local area)
- Invasive Species and the impact they have on biodiversity

Outcome statement	Curriculum area
<p>I have used a range of ways to collect information and can sort it in a logical, organised and imaginative way using my own and others' criteria.</p> <p>MNU 1-20b * Responsibility of all</p>	<p>Numeracy > Information handling > Data and analysis</p>
<p>I have carried out investigations and surveys, devising and using a variety of methods to gather information and have worked with others to collate, organise and communicate the results in an appropriate way.</p> <p>MNU 2-20b * Responsibility of all</p>	<p>Numeracy > Information handling > Data and analysis</p>
<p>I can solve practical problems by applying my knowledge of measure, choosing the appropriate units and degree of accuracy for the task and using a formula to calculate area or volume when required.</p> <p>MNU 3-11a * Responsibility of all</p>	<p>Numeracy > Number, money and measure > Measurement</p>
<p>I can apply my knowledge and understanding of measure to everyday problems and tasks and appreciate the practical importance of accuracy when making calculations.</p> <p>MNU 4-11a * Responsibility of all</p>	<p>Numeracy > Number, money and measure > Measurement</p>
<p>Using technology and other methods, I can display data simply, clearly and accurately by creating tables, charts and diagrams, using simple labeling and scale.</p> <p>MTH 1-21a</p>	<p>Mathematics > Information handling > Data and analysis</p>
<p>I can display data in a clear way using a suitable scale, by choosing appropriately from an extended range of tables, charts, diagrams and graphs, making effective use of technology.</p> <p>MTH 2-21a</p>	<p>Mathematics > Information handling > Data and analysis</p>
<p>I can display data in a clear way using a suitable scale, by choosing appropriately from an extended range of tables, charts, diagrams and graphs making effective use of technology.</p> <p>MTH 3-21a</p>	<p>Mathematics > Information handling > Data and analysis</p>
<p>I can select appropriately from a wide range of tables, charts, diagrams and graphs when displaying discrete, continuous or grouped data, clearly communicating the significant features of the data.</p> <p>MTH 4-21a</p>	<p>Mathematics > Information handling > Data and analysis</p>
<p>I can distinguish between living and non living things. I can sort living things into groups and explain my decisions.</p> <p>SCN 1-01a</p>	<p>Sciences > Planet Earth > Biodiversity and interdependence</p>
<p>I can explore examples of food chains and show an appreciation of how animals and plants depend on each other for food.</p> <p>SCN 1-02a</p>	<p>Sciences > Planet Earth > Biodiversity and interdependence</p>