

SEFARI

LEADING IDEAS
FOR BETTER LIVES



Leading ideas for Education



SRUC



Royal
Botanic Garden
Edinburgh



BioSS



More dun



The Rowett
Institute



The James
Hutton
Institute



Scottish Government
Riaghaltas na h-Alba

Leading ideas for education



Introduction:

The Scottish Government's Environment, Natural Resources and Agricultural (ENRA) Strategic Research Programme for environment, land use, agriculture, food and rural communities is delivered by the Scottish Environment, Food and Agriculture Research Institutes (SEFARI).



Royal
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Edinburgh



The ENRA Portfolio also includes the underpinning of national resources at SEFARI (e.g., research farms and national data sets) and a partnership between SEFARI, Scottish Universities and Agencies and the policy-facing Centres of Expertise. Work is brought together under an ethos of “Leading Ideas for Better Lives” by SEFARI Gateway, the Portfolio’s Centre of Expertise for Knowledge Exchange and Innovation.

Science education underpins all our work and through a commitment to fostering curiosity, critical thinking, and innovation – together we aim to inspire the next generation of scientists and provide them with the skills and knowledge necessary to address the complex challenges society is facing.

This booklet is dedicated to sharing science education resources created across SEFARI which cover a variety of ENRA topics, are free to access, and were designed on the premise that learning is for everyone.

Come on a Microbe Safari



Microbes play a wide variety of essential roles in keeping our guts healthy and in supporting food and agriculture production.

However, some microbial populations can cause serious disease. This includes infectious microbes spread in air or water, as well as foodborne pathogens and pathogens of food-producing animals and crops.

To connect learners and the public to these important themes, and offer educational support in this area, SEFARI researchers created the interactive website "Microbe Safari".

"Useful and accessible information focusing on the diversity of microbes"

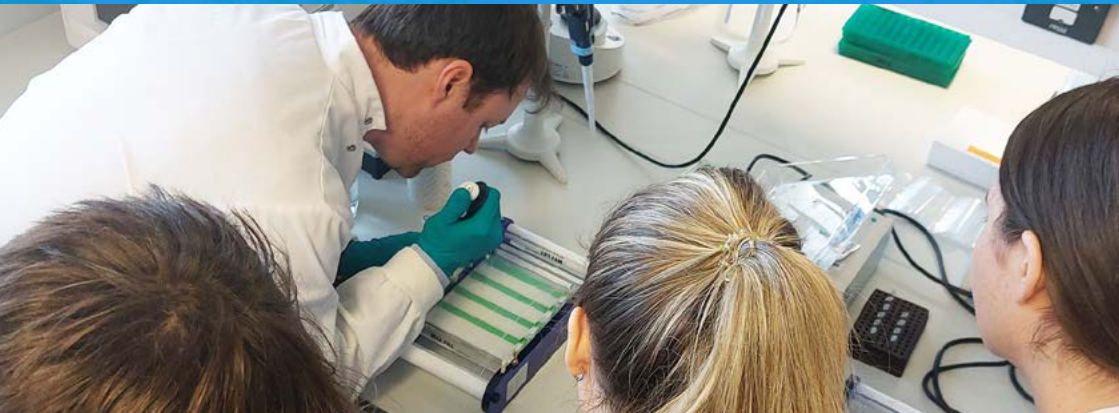
Highlights include:

- Useful and accessible information focusing on the diversity of microbes related to gut health, food safety, food production and the environment.
- Interactive STEM activity Disease Detectives, which demonstrates how mass spectrometry is used to identify bacteria and other foodborne pathogens.
- Two SEFARI animations on the role of microbes in gut health that highlight the importance of having a diversity of bacteria in the gut.
- Curriculum-linked resources, including one that outlines the science behind the COVID-19 PCR test, connecting learners with real-world scenarios.

The [free site](#) explains all aspects of microbes from the field to the fork and further and demonstrates the interconnection between issues that microbes raise. The editable resource is kept up-to-date and is responsive to emerging issues based on teachers' needs.



Educating pupils thanks to Business and Community Support Officers (BCSOs)



It is crucial to educate the next generation on the work that research institutes conduct, but with time pressure on teachers and researchers coordinating these opportunities can prove difficult.

Thanks to the Excelerate Business and Community Support Officers (BCSOs) in Aberdeen and Aberdeenshire this process has become much easier.

The Wood Foundation employs BCSOs as a community-connected link between teachers and external bodies to foster meaningful, real-world learning experiences for pupils aligned with the school's vision and curriculum. For some SEFARI institutes, this has been invaluable.

The BCSOs can request bespoke activities on curriculum-based topics to satisfy teaching requirements, and researchers work to meet these goals to disseminate their own knowledge.

The Rowett Institute has built strong relationships with a number of these officers and subsequently connected with Kemnay, Bucksburn, Harlaw and Northfield Academies. From hosting a fish-themed activity morning for S1 Northfield pupils to bringing fresh food insecurity research to Modern Studies classes in Kemnay, the experiences have been mutually beneficial.

Working collaboratively with BCSOs has opened a new channel for unique pupil engagement activities, encouraging researchers to think creatively on how to share their work and inspire pupils while passing on their knowledge and passion to exceed school objectives.

“BCSOs can request bespoke activities on curriculum-based topics to satisfy teaching requirements, and researchers work to meet these goals to disseminate their own knowledge”

Tinned Fish Tasters to Diversify Seafood Consumption



Seafood is a high-quality lean protein, low in saturated fat, high heart healthy omega-3 fatty acids and important micronutrients such as vitamins D, B12, iron and zinc.

But the UK population only eat an estimated 110g of seafood a week which is around half the UK dietary recommendation of two portions of fish a week, one being oily. People list taste, price and preparation knowledge as barriers to higher consumption.

Tinned seafood could be the solution. It is cheaper than fresh and frozen fish, requires little to no cooking and many are now sold in various sauces (such as korma and tomato), with many species to choose from. By increasingly incorporating them into our diets, they could diversify seafood consumption.

To test this, the Rowett Institute designed a 'Tinned Fish Tasters' activity that was piloted at the Royal Highland Show. Staff offered tinned anchovies, pickled mussels, and mackerel and herring in sauces, asking visitors whether they would eat tinned fish. After tasting, we asked them to vote on whether they would buy tinned fish or try some at home. Of 72 visitors, 59 people (82%) voted yes, 9 voted no (13%) and 4 were unsure (6%).

The Rowett has since run this activity with primary schools, secondary school classes (Home Economics and Modern Studies), and the public to spread the message that tinned seafood offers a low-cost, nutritious, tasty and convenient seafood option that could contribute to net zero diets while bolstering Scotland's economy and public health.

Read more in our [blog](#).

“Unlocking tinned seafood: a tasty path to healthier diets and sustainable living”



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Sow, Grow and Share



Growing your own food can seem daunting especially if you don't have access to a garden, so SRUC lead the science and growing aspects of a nationwide celebration of sowing, growing and sharing. The ['Dandelion' project](#) proved that it is possible to grow your own fresh, healthy and nutritious food anywhere and in anything! From window box containers to playground tattie growing, over 89,000 pupils, plus their families and carers took part in a Dandelion activity across 468 schools culminating in hundreds of harvest festivals. Pupils explored how to produce food sustainably, and the joy of gathering to share and celebrate their harvest. With straightforward guidance on growing and ideas for experiments, pupils explored different ways of growing from 'digging the dirt' right through to mini vertical farms.

The resources developed by SRUC's staff and students to get schools growing align perfectly with healthy living / eating / sustainability and science aspects of the curriculum. Keep Scotland Beautiful added ideas on harvest festivals and fun activities to run alongside the growing. Many of the schools that engaged have carried on with their sow, grow and share activities using the resource packs and ideas developed.

Partners included: Sustrans, BEMIS, Feis Rois, James Hutton Institute and Aproxima Arts.

“Over 89,000 pupils, plus their families and carers took part in a Dandelion activity across 468 schools, sowing, growing and sharing their food”



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How can statistics help combat climate change?



When learning maths and statistics, it can sometimes be challenging to imagine how these skills are used outside of the classroom. To combat this, the Royal Statistical Society's William Guy Lectureship scheme aims to engage with schools across the UK to highlight the importance of statistics in the real world. This year, the focus is on climate change.

“When we build wind farms, what happens to the wildlife?”

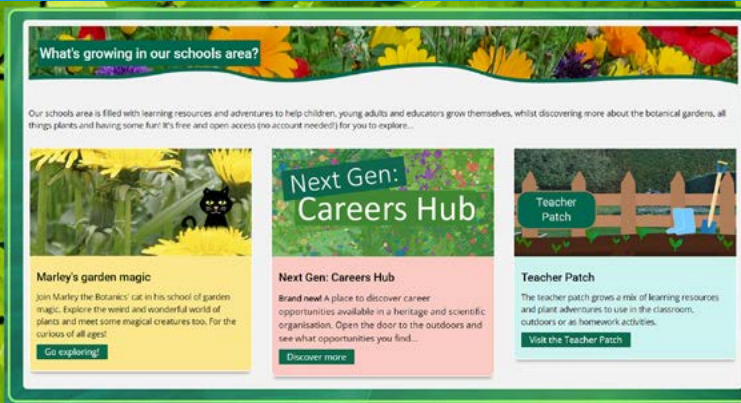
Katherine Whyte, an environmental statistician at BioSS, has been appointed by the Royal Statistical Society as one of their William Guy Lecturers. As part of her role, she has created a video that can be used as a resource in schools, called [“When we build wind farms, what happens to the wildlife?”](#). In this interactive video, Katherine looks at how we can use maths and statistics to help us balance the benefits of wind energy with the risks posed to ocean wildlife like seals and seabirds. Although targeted at a primary school audience, the video should be accessible to a wide range of ages and is relevant to issues cutting across the curriculum including numeracy and mathematics, science, technologies, and social studies.

This resource was created thanks to support from the Royal Statistical Society (RSS). On the RSS YouTube channel there are also videos by Craig Anderson (University of Glasgow) on air pollution, and Eleanor D'Arcy (Lancaster University) on extreme sea levels.



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Grow your knowledge and skills through our online learning resources



Explore our [online resources](#) for all ages in our online learning site.

- For younger learners and families - meet garden plants and wildlife and see how biodiversity is interconnected, open the lid to our wormery to see how worms turn food waste into compost, or meet a real smelly giant the Titan arum plant.
- For 16+ or adult learners - take your knowledge further in topics such as climate change and botany.
- For teachers – visit our Teacher's Patch for curriculum-linked, self-led resources you can use with primary and secondary learners both in the classroom and as a focus for outdoor learning sessions.
- For secondaries and young people – gain practical skills and get an insight into STEM careers, such as horticulture, by undertaking our simulated tasks in our Next Gen careers area.

“Gain practical skills and an insight into STEM careers, such as horticulture, by undertaking our simulated tasks in our Next Gen careers area”

If you are curious about how you can better protect the beautiful planet we live on, there's no better place. Go to our learning site to find out more about plants, biodiversity, sustainability and how you can take action to protect our botanic world.



Disease Detectives Wanted!



Bacteria, virus or parasite? Disease can be caused by a variety of different microorganisms and their detection is fundamental to sustainable agriculture, animal welfare and food safety.

Using pneumonia as an example, discover how the cause of an illness can be identified and why catching the culprit is so important in order to provide effective treatment. Simple explanations of scientific theory and practice are given followed by relevant experiments and activities. The workshops can be undertaken in the classroom or onboard our 'BioBus' – Moredun's mobile laboratory.

Although the narrative is based around sheep and cows, the key elements are easily transferable with the topic lending itself to wider discussion around vaccination, food security and "One Health", meaning how livestock, wildlife, people and the environment are connected.

Our activities are run by real scientists and allow learners from P4 to S6 to gain hands-on experience of laboratory techniques and recording data. School visits also focus on careers and health, encouraging an interest in STEM subjects and showing relevance to present-day issues. We always welcome feedback from teachers to enable activities to be improved and updated.

Disease Detectives links with the following areas of learning:

- Body systems and cells
- Biodiversity and interdependence
- Inheritance
- Health & Wellbeing
- Expressive Arts
- Literacy and English

"Microbial mysteries unveiled: from lab coats to livestock, we're on the case!"



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Get curious about our green planet at Royal Botanic Garden Edinburgh!



We are a leading botanic garden and a global centre for biodiversity science, horticulture and education.

We conserve one of the world's richest botanical collections at our four gardens – Edinburgh, Benmore, Dawyck and Logan.

Join us in our exciting learning and events programme for all ages where you can learn more about the wonderful world of plants. Visit our edible garden to find out how to grow your own food, find out more about our international research, become a scientist for the day in our Science Festival activities, or experience creative responses to current environmental and social issues in our exhibitions. Bring your class and explore STEM topics and learning for sustainability in the garden.

Join us in the garden and find out how you can be part of our vision for a positive future for plants, people and the planet.

Check our [website](#) for news about our new offers and how we can bring the learning to you, whether through virtual lives or our outreach workshops.

“Join us in the garden and find out how you can be part of our vision for a positive future for plants, people and the planet”



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Water Words



Water is a precious resource. Individuals and communities need to protect our water resources and this begins in the classroom. From water play in nursery school, at primary school in field classes and water flow studies, through to learning about how water plays such an important role in food production, weather, and geography and environmental studies.

Therefore, through collaboration with SEFARI portfolio partners, teachers at Dollar Academy, the Scottish Agricultural Organisation Society and Ping Creates, we have produced a series of educational posters designed to promote discussion, on four important water topics: 'The Hydrological Cycle', 'Water and Farming in Scotland', 'Water and Climate Change in Scotland' and 'Water and Global Climate Change'.

These educational materials can be used by all ages, both as an online teaching resource and printed out as a backdrop for the class to enjoy. The posters can stimulate discussions on topics such as the changes to our land due to climate change, how much water is in our food and where can we best grow vegetables in Scotland and why. Together, we want to provide future generations with the knowledge and awareness necessary to safeguard one of our most precious resources: water.

Read more in our [blog](#).

*“Flowing
knowledge:
cultivating
curiosity and
nurturing water
wisdom”*



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