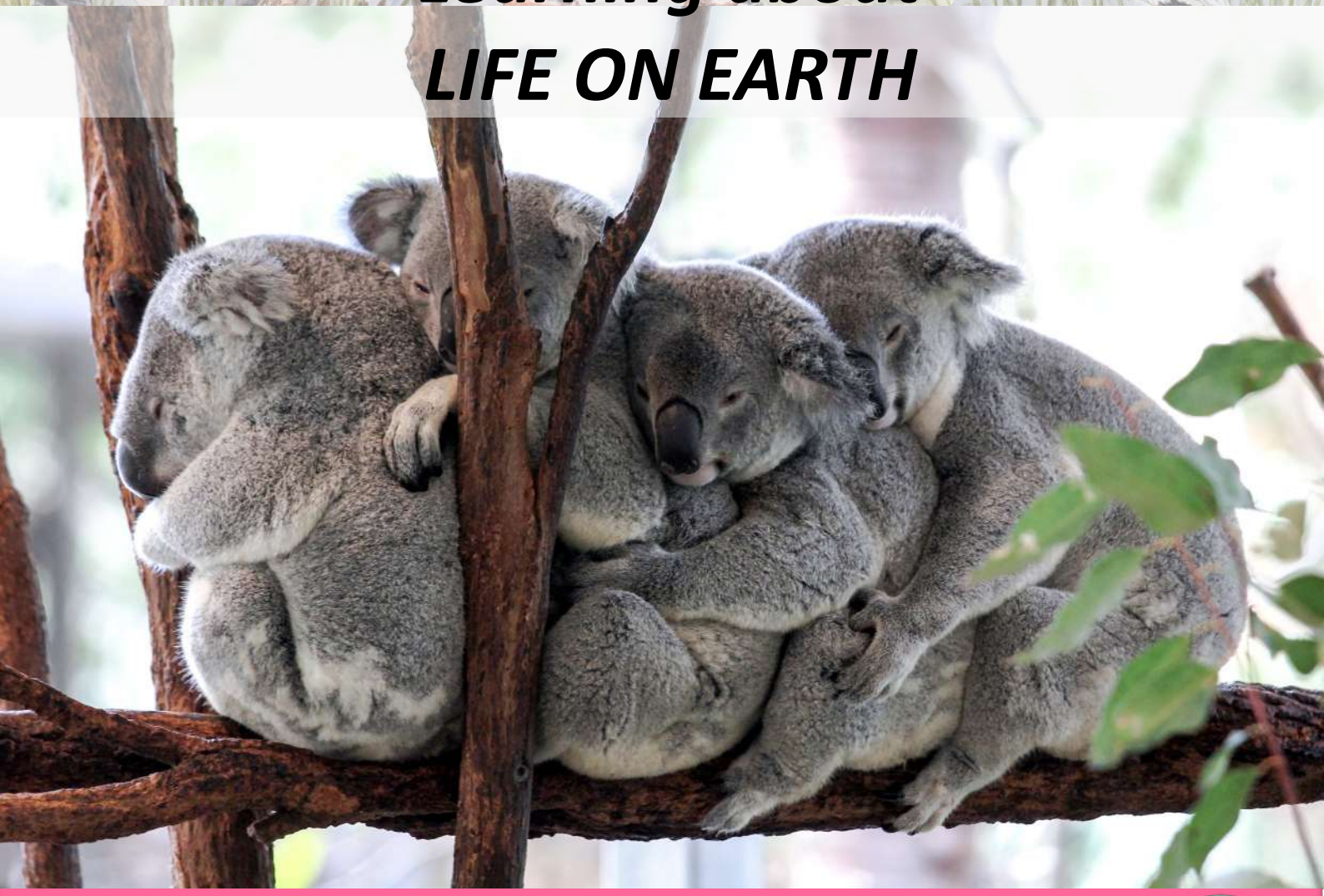
ISSN 0 309-8451

Vol 132 Spring 2023

# Environmental Education

## *Learning about LIFE ON EARTH*



The Journal of the National Association for Environmental Education (UK)

1971 Celebrating 50 Years 2021
NAEE
Registered charity no. 1166502

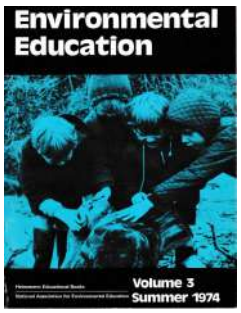
# National Association for Environmental Education (UK)

*Promoting environmental education, supporting all those involved in its delivery, so that together we can understand and act on the need to live more sustainably in order to protect the future of our planet.*

## NAEE started life in 1960 as the National Rural Studies Association, changing its name and emphasis in 1971.

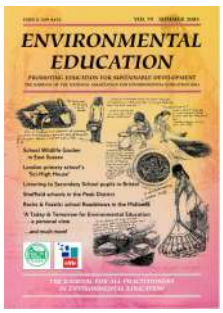
Since then, the Association has continued to support a wide range of professional educators to help them improve the quality of their teaching and their students' learning, in relation to environmental and sustainability issues.

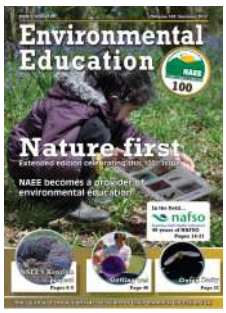
In 2021, we celebrated our 50th anniversary, which included a new Wikipedia page, a new logo and a 50th anniversary edition of our journal. As part of our celebration, all the back copies of *Environmental Education* were digitised. Volumes 1 to 130 can be freely accessed here: tinyurl.com/2p8fsv6a. The most recent copies can also be found here: naee.org.uk/ee-journal.













NAEE is a Charitable Incorporated Organisation [Charity No. 1166502] that is run by its members and volunteers who care passionately about environmental education and education for sustainable development. Our charitable object is to provide a public benefit by advancing environmental education within early years settings, primary and secondary schools, and institutions responsible for teacher education within the UK and elsewhere. Teachers are encouraged to become members and also welcome to submit articles for this journal. For more information, contact info@naee.org.uk.

**Join NAEE.** Members receive these benefits:

- Environmental Education journal 3 times a year
- Resources and information for teachers and educators
- Network with outdoor and environmental education specialists

**Write for us:**

We are always on the lookout for examples of adults working with children and young people in nature. For further information, email info@naee.

**NAEE online:** naee.org.uk

twitter.com/naee_uk facebook.com/UKNAEE


## National Association for Environmental Education (NAEE UK)

**President** Professor Justin Dillon

**Vice Presidents** Professor Joy Palmer Cooper, John Kenrick, Professor Mick Waters

**Life Members** Norman Farmer, Sue Fenoughty

**Trustees** Professor William Scott, Professor Justin Dillon, Dr David Dixon, Sheila Gundry, Nina Hatch, Dr Elsa Lee, Dr Paula Owens, Dr Morgan Phillips, Dr Paul Vare

**Executive Support Group** Gabrielle Back, David Fellows, Juliette Green, Sue Leslie, Henricus Peters, Sue Shanks, Alona Sheridan

**Fellows** Judy Braus, Margaret Fleming, Graham Frost, Henry Greenwood, Quinn Runkle, Dr Jessica Tipton, Suzanne Welch



**Environmental Education | Volume 132, Spring 2023**

**Editors** Henricus Peters, Juliette Green

**Proofreader** Alona Sheridan

**Executive Editor** Dr Elsa Lee

ISSN 03098451 © NAEE 2023

**NAEE Office** Department of Education, University of Bath, Bath, BA2 7AY. **Office Administrator** Carolina Salter
**Email** info@naee.org.uk **Web** naee.org.uk

# Contents

*Environmental Education* Volume 132










## Comment


| | | |
|---|---|---|
| 4 | Editorial | *Henricus Peters* |
| 4 | From the Deputy Director | *Dr Elsa Lee* |
| 4 | From the President | *Professor Justin Dillon* |


## NAEE Regulars


| | | |
|---|---|---|
| 5 | **Young Writer** Environmental work experience | *Megan Day* |
| 6 | **Kenrick Days** *Stick Man* science and more! | *Alex Williams, Kelly Sallis & Maymoona Khan* |
| 8 | **Funded project** Carbon literacy in Leicester schools | *Laura Barke* |


## Biodiversity


| | | |
|---|---|---|
| 9 | The importance of insects to general biodiversity | *Nikki Banfield* |
| 10 | Curiosity and connection through nature journaling | *Bethan Burton* |
| 11 | Champions of biodiversity | *Jordan Allen & Allison Hands* |
| 13 | Keeping biological records | *Sam Amy* |
| 14 | London Waterworks Park: a new blue space in London | *Matthew de Kretser* |
| 15 | Zoos and biodiversity – the role of conservation education | *Tania Kahlon* |
| 16 | Shaping sustainable futures through education | *Matt Darsen-Law* |
| 17 | Chronicles of Dunwich: an arts and environmental heritage outreach project | *Tim Holt-Wilson* |
| 20 | Co-production and Youth Action Partnerships: introducing the 'Challenging the Climate Crisis' project | *S. Williams, R. Portus, M. Robertson, H. Preston, O. Reynolds, I. Griffiths, E. Pykett, M. Currie, R. Stranger & L. McEwen* |
| 22 | Invasive alien Nile tilapia in the Limpopo and Mpumalanga Provinces of South Africa | *Dr Mandla Magoro & Lucky Dlamini* |
| 23 | Curious connections – working across borders to protect the world's slowest mammal | *Katra Laidlaw* |


## Reviews


| | | |
|---|---|---|
| 25 | Book reviews | *H. Peters, E. Lee & J. Green* |
| 26 | Webwatch | *Henricus Peters* |
| 28 | Final thought | *Henricus Peters* |


**Front cover images:** Artist's impression of the planned East London Waterworks Park, credit Matthew de Kretser; 'Cuddle train', credit Lone Pine Koala Sanctuary.

***Environmental Education*** **is the termly journal of NAEE. Views expressed in the articles of this journal are those of the authors and do not necessarily represent those of NAEE.**

## Editorial

### Henricus Peters



Biodiversity is such an important topic which you can never have enough information about – remembering that with information comes growing awareness and from there we can take positive action.

The recent BBC series *Wild Isles* which focused on the biological diversity of Britain – via excellent storytelling and amazing footage – also highlighted this need for reflection, followed by action.

That some newspapers have a dedicated news tab page on the subject - yes, it's now a 'daily' staple in some mainstream newspapers - is simultaneously useful and worrying.

So this journal goes behind the scenes to answer questions, amongst them: Why are insects so important to our biodiversity? Why is good data a key to understanding our biological diversity in the United Kingdom?

Further afield, we ask what happens with invasive species in South Africa; and how a naturalist is, through journaling, reconnecting with her own patch in Australia.

As this journal goes to press, the very latest news just in from the world of conservation is that three Australian birds – the Pink Cockatoo, Hooded Robin and Diamond Firetail – have recently been added to that country's list of threatened species; while two others – the Red Goshawk and Painted Button-quail – have had their conservation status 'uplisted'. This shows just how the biodiversity of our planet's species is so very changeable – and mostly for the worst outcome! If the articles in this journal can help us to better understand the complex dynamics of life on Earth, we – and the species we share with – will be better for it.

We are very happy to re-establish our Young Writer series, with Megan Day. NAEE is very much about giving the younger generation a crucial voice!

With our Chair Bill Scott, I again had the privilege of judging the COBIS (Council of British International Schools) annual school video competition – the Eco Film Awards – where schools submit videos of environmental projects that the students have carried out. Information and winners will appear in the NAEE weekly update.

Let us know what you think of this journal via info@naee.org.uk and follow us on twitter @NAEE_UK. We look forward to hearing from you!

Thank you for your ongoing support – including reading *Environmental Education*.

## From the Deputy Director

### Dr Elsa Lee



I have been a part of NAEE for the past 6 years and it has enriched my life no end so I encourage you to join us if you can. Now I have the pleasure, as Deputy Director, of writing this issue's message. I am sure you will find your own favourites in this issue, but for me the articles from our Kenrick Days funding programme are always endearing and encouraging and the ones in this issue are no different. I also loved the nature journaling article. I am determined to find the time for this myself one day, perhaps you will too when you see how it is described here. I loved Tim Holt-Wilson's piece about the role of the arts where he asks a wonderful thought provoking question about nature on Mars. I hope too that you will find the book reviews and the list of websites and resources helpful for your teaching and learning. Overall, I think the message of this issue is one that we are hearing from all sides at the moment, and that is that we need to work every day to live in harmony with the world around us, to find ways to support our neighbours and to joy in the diversity of this one beautiful world. Thank you to Henricus and Juliette for doing a wonderful job of delivering that message so beautifully.

## From the President

### Professor Justin Dillon



I recently had the privilege of visiting XP East in Doncaster. This secondary school is part of the XP Trust which is breaking new ground in how the curriculum can be implemented. The Trust uses a project-based approach involving key questions that students tackle in groups through learning expeditions. Some of the projects result in substantial and impressive displays which are on display around the school. One of the projects on display was entitled Bee Kind, which focused on the plight of bees in the UK and the wider world. Students examined how different factors, including human influence, are resulting in colony collapse disorder. They began the expedition by going on an 'immersion experience' visiting local beekeepers' hives where they could see how bees live and work and the problems that beekeepers face in keeping their hives thriving.

What was particularly impressive, from an environmental education perspective, was that the students studied how they personally could help bees. Their solution involved raising awareness in the community, encouraging others to do their bit to help safeguard the future of bees.

Students worked with Doncaster Metropolitan Borough Council to develop additional wildflower sites across the town and on the school site and produced information panels and materials for the council to publish on their social media accounts. All in all, an exemplary educative experience benefitting the student, the school and biodiversity.

YOUNG WRITER

# Environmental work experience

Megan Day

As a Year 13 student studying for my A-Levels, university, and soon employment, are approaching fast. From A-Level subjects, to university courses, to gap years, everything right now seems crammed with decisions. For many, this is too much – the pressure of making so many decisions at once can be overwhelming, especially given their great importance. One choice, made before you're even of age, could change the trajectory of your life forever.

This is a scary thought, but luckily there are ways to help. If you simply try out the options first, it makes the final decision much easier to make. This is why I believe that work experience is an extremely important opportunity, and that all 16-18-year-olds should try to make the most of it.

I was due to do my first work experience placement in 2021, after my GCSEs, but this was unfortunately cancelled due to COVID – as were the exams. However, hope still remained, as I entered Sixth Form and was told to prepare a placement for the summer. I have been fascinated by the natural world as long as I can remember, which has prompted me to apply for Zoology at university next autumn, leading me down a career path of research and conservation. Because of this, I decided that a wildlife conservation organisation would be the best fit for my work experience. I emailed 2 organisations – WWT Slimbridge and RSPB Nagshead – both very different nature reserves, but both great places to learn more about a possible future career.

My first placement was at Slimbridge, the headquarters of the WWT – an excellent place for birdwatching and a popular day trip destination. On my first day, I was unsure of what to expect, but after I had met the team from the Conservation Evidence department and had a tour of the reserve, I felt very excited – could this be my future workplace?

The buildings had amazing views of the Rushy, one of the many lakes that form the wetlands. Downstairs, a lab, fully kitted out for chemical analyses, including eDNA (environmental DNA) processing. I learnt a lot about eDNA during my placement – simply put, it is a way of detecting where various organisms have been previously, using DNA which they have shed into a body of water. I was lucky enough to help collect samples for this analysis, although it wasn't as easy as I first thought! The original plan was to collect samples from a small collection of ponds in a nearby privately-owned estate. Although we were given permission to collect samples, all of the ponds had been netted off. Although this was a setback, I enjoyed the authenticity of the experience; I was glad to experience how conservation work really is. This felt like a good sign that this job could be a good fit for me in the future.

Eventually, I was able to do the sampling properly, in some of Slimbridge's own ponds. I measured pH and dissolved oxygen using probes, then collected samples for lab work. During the lab work, we measured the levels of various dissolved substances using a spectrophotometer, which was particularly interesting to me, having previously used a colourimeter (similar, but smaller) during biology lessons.

In August, I started my placement at RSPB Nagshead, a beautiful wooded reserve in the heart of the Forest of Dean. One of the main attractions at Nagshead is the Hawfinch – a large, striking bird, which is unfortunately red-listed – there are only around 1,000 pairs left in the UK. Just after I arrived, I was taken on a walk around the reserve, giving me a good sense of the area. My first impressions were that it was very different to Slimbridge. Being a prominent tourist attraction, Slimbridge is loud and busy, but Nagshead felt much quieter and closer to nature.

At the end of the walk, I helped recover a trail camera, which had been on a tree facing a badger sett for the past week. The footage was excellent to see – as suspected, there was a badger cub! Also recorded were many other different species, including foxes, deer, squirrels and rabbits. Nagshead truly is a haven for nature. I also helped with more practical sides of working on a nature reserve. I helped to create a temporary nature trail for children, as well as writing some more permanent signs, informing visitors about what they can expect to find at Nagshead. This was an excellent opportunity, as it really made me appreciate the value of teaching others about the natural world. After all, this is what made me so interested in conservation in the first place.



The Rushy at Slimbridge. Image: Megan Day

Overall, I thoroughly enjoyed both placements and would highly recommend it to others my age – I learned so much and it has undoubtedly helped to prepare me for my future!

**Megan Day** is an A-level student. She is a regular volunteer with her local Wildlife Trust and hopes to study Zoology at university.

# *Stick Man* science and more!

Alex Williams, Kelly Sallis & Maymoona Khan

## Stirchley Primary School Year 1 visit to Martineau Gardens, November 2022

Alex Williams

During Year 1's recent cross-curricular visit to Martineau Gardens, the children were given a unique experience to explore our current topics in a fantastic outdoor environment. This was the first major trip that this cohort had been on since they started school, due to the previous years of Covid disruption.

We focussed our learning around the Julia Donaldson book *Stick Man*. Whilst going on a Stick Man trail to find characters from the story, the children explored our geography topic: the seasons. They observed the changes across the four seasons, describing the weather associated with the seasons, hibernation and how day length varies through a variety of questions found around the grounds and in the woodland. They thoroughly enjoyed the trail, especially when they found Stick Man up in a tree!



On the Stick Man trail with Juliette Green, Martineau Gardens' Environmental Education Teacher.

Through our science focus, we explored materials and the senses. The children made a model Stick Man using a range of materials. One child said, *"My favourite part was making Stick Man and Stick Lady Love and sitting and watching the film with them!"* Another child said, when exploring their senses, *"I liked it when we ate some herbs, the mint reminded me of mint chocolate."* All the children enjoyed putting on blindfolds and using their sense of touch to describe nearby trees and natural objects. They also loved moving the logs to use their sense of sight to find minibeasts. One child said, *"That is the biggest worm I've ever seen!"*

The impact of such a trip was and is still evident today. As the children are the younger end of school these skills are invaluable to support them through their school career. Within our school community, we have 34% on



Choosing natural and human-made materials to make a model Stick Man.

Pupil Premium and 32% who receive an income-based free school meal. Our school is in a built-up urban environment and some of the children do not have access to a green space at home as well as within school so consequently may not have experienced a woodland/ garden experience before our visit. Due to the immersive and tactile learning experience, the children – regardless of background or their own individual barriers to learning – were able to benefit from the positive and nurturing elements of being outdoors. Since the trip, some children have started to make their stick people, create natural art using leaves and have even visited the centre again with their parents.



Investigating how evergreen leaves remain on the trees during winter,

When back at school, the children's experiences and photos were shared on our website and parents' weekly newsletter. In addition to that, a few children also had an opportunity to share their favourite bits in our celebration assembly. The children will remember a fantastic adventure with the brilliant staff leading engaging activities. A personal highlight was found on our return to school as we huddled under a small bus stop trying to keep ourselves dry from the cold, torrential rain and unexpectedly all the children began to chant *"best day ever!"* with the biggest smiles on their faces, which in the end is what it's all about. Thank you for giving the children this opportunity.



Enjoying playing in the sandpit – despite the rain!

**Our Lady of the Wayside Catholic Primary School Eco Council visit to Birmingham Botanical Gardens, November 2022**

**Kelly Sallis**

Our school Eco council (with a representative from each class, two from each year group), looks at ways they can promote living simply, sustainably and in solidarity with the poor. Throughout our visit to the Botanical Gardens the children were learning how their actions impact the wider ecosystem. They explored the diverse types of landscapes throughout the world and learned how we depend on all these habitats for our food, shelter, air quality and medicine. The trip met our curriculum outcomes of 'inspiring in pupils a curiosity about the world' and developing a deeper understanding of the world's 'diverse places, people, resources and natural and human environments'. Following the trip I, as the Eco Lead, shared our learning with teaching staff and the children shared their learning with their year group peers.

In our presentation, the Eco Council set the following goals for us as a school:

- Plant more trees and plants across our school site
- Increase the use of our greenhouse and allotment
- Encourage our children and families to consume less meat and be mindful of where our meat comes from
- Raise further awareness throughout school about the impact of our actions on the environment, including updates in our school, parish, and MAC newsletter and on Twitter
- Develop our nature area based on ideas observed at the Botanical Gardens including planting pipes, ponds with access for nature and gardens which encourage minibeasts, particularly bees and butterflies

Children said that the visit was *"interesting, fun and taught me a lot about plants around the world"*. They particularly enjoyed being able to handle a variety of animals and the sensory experiences with plants (smelling, touching, and observing plants from across the world).

We will shortly be using evidence gained on this trip as part of obtaining our 'CAFOD Live Simply Award' and once accredited will share our learning with the Parish and wider MAC community.

**Christ Church CE Primary School's Year 1 visit to Mount Pleasant School Farm, October 2022**

**Maymoona Khan**

We are a Year 1 class that had the privilege of visiting Mount Pleasant School Farm. This wouldn't have been possible if we did not have the grant from the NAEE. At the time of the visit, we were studying the 'Animals Including Humans' topic in science, and the farm visit was a finale to the topic.

The visit allowed children to see animals and see what farms are like. The children were able to see cows and baby calves. They visited the dairy and saw how milk is produced. While at the farm children were introduced to solar panels and learned about how they benefit the farm. The children also looked at recycling and during lunchtime they all had to carefully recycle their waste.





Hands-on experience of feeding the farm animals.

## NAEE FUNDED PROJECT

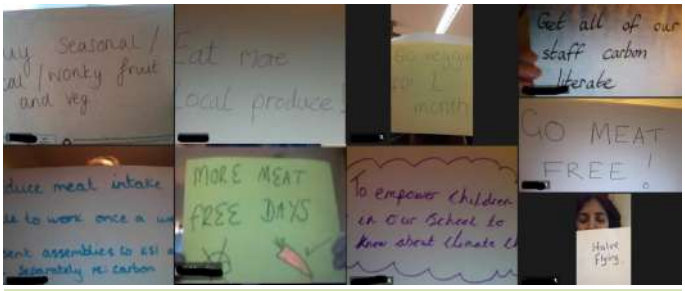
# Carbon literacy in Leicester schools

**Laura Barke**

On 1 February 2019, Leicester City Council declared a Climate Emergency. In its declaration, the council committed to developing a new action plan to address the emergency through our own services and projects, with the aim of the city becoming zero carbon.

Carbon emissions from schools account for approximately 41 per cent of the Leicester City Council's carbon emissions, meaning inspiring schools – students, staff and governors – to act is a specific target for the Sustainable Schools Team. The team run workshops with children on areas relating to environmental education and have recently had the opportunity to develop a carbon awareness course for pupils, building on the approach taken by the Carbon Literacy Project while adapting the programme in line with the needs of the students.

The aim of the Carbon Literacy Project is to develop 'an awareness of the carbon dioxide costs and impacts of everyday activities, and the ability and motivation to reduce emissions, on an individual, community and organisational basis'. We initially used these aims to create a day-long workshop for KS2 and KS3 pupils, drawing attention to the climate emergency through focusing in on greenhouse gases, their sources and ways of reducing emissions in appropriate and realistic ways for the children. This was made possible through funding from NAEE.




Online course undertaken by teachers and governors.

Although the effects of covid delayed the progress of the project, we have now worked with nearly 650 school-aged pupils. This included 90 children from Year 1 and Year 2 who were, by the end of the session, able to explain how greenhouse gases related to climate change. Alongside this, we worked with 20 university students to help deliver the sessions in schools. This relied on the students first becoming Carbon Literate, then taking part in a 'train the trainer' session, providing the university students with the skills and confidence required to approach the difficult, complex topics with school pupils.

Our workshop started off by introducing the children to climate change and the climate emergency. Following this, we focused in on greenhouse gases, understanding the damage they cause along with the sources that are most often creating them. We looked in detail at emissions relating to food and transport and considered the areas having the greatest impact on carbon footprints within schools specifically. The end of the session involved a 'Carbon Classroom' activity where the children have an opportunity to share their learning on climate change by presenting back to peers and other members of the school community. This involved lots of posters, games, leaflets and even a song!



University students participating in Carbon Literacy training

Feedback from schools has been very positive throughout the sessions. Staff involved in the sessions reported that they noticed how engaged the students were and how much they had learnt while also recognising the benefits of engaging young people in these serious, and often complicated, conversations. Our aim is always that both staff and children come away from the sessions feeling empowered to make a difference, through their actions and through continuing the conversation with other people around them. One school reflected that "*the school community are trying their best to make the changes needed and to educate pupils and families to improve and sustain our environment. It was great to hear the children so positive and so serious about it*". Staff often also pointed out how much they themselves had learnt!

It is positive to see a mention of Carbon Literacy in The Department for Education's new *Sustainability and climate change: a strategy for the education and children's services systems*. Within this policy, they have stated that each school should have a staff member responsible for sustainability issues in their school, including being trained in Carbon Literacy; something which many of our Leicester schools have already achieved. This will further support the longevity of the project as school staff will also be able to deliver the carbon awareness course for school pupils.

The biggest learning point for us following work on this project is that children are keen to be involved in conversations surrounding climate change and can meaningfully reflect on their individual actions, and the actions of others, when considering what they could change to reduce their impact. This needs to be done in a safe and well managed way, but ensuring staff are fully aware and trained in the same learning ensures longevity of the work in schools. We hope to continue this work into the new year, both training staff in Carbon Literacy and running, or supporting others in delivering, carbon awareness workshops for students in schools.

**Laura Barke** is a Project Officer at Leicester City Council and a former primary school teacher.

**Contact:** laura.barke@leicester.gov.uk

**More information:** schools.leicester.gov.uk/eco-schools

# The importance of insects to general biodiversity

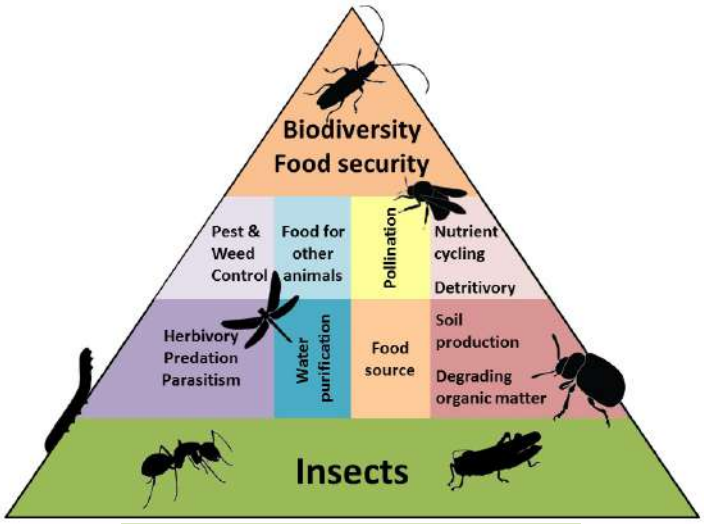
Nikki Banfield

*"Insects make up over half the species on Earth, our planet's health depends on them."*

*"The rate of loss of insect life is much faster than that of higher profile wildlife like birds and mammals – the local extinction rate for insects is eight times higher!"*

These rather dramatic sounding statements are just two of many similar phrases used throughout the Buglife website; from our home page[1] through to our NoInsectinction[2] campaign page and beyond.

Readers probably wouldn't expect anything less from a conservation charity which champions the *"small things that run the planet"*. It's what we were born to do.




The importance of insects. Image: Buglife.

**Buglife is born (or should that be hatched?)**

Buglife came into being following the realisation, in the 1990s,that there was no organisation flying the flag for all invertebrates. No-one making sure that the conservation needs of invertebrates were being looked after or championed. This was brought even further into focus by the publication of the UK Biodiversity Action Plan[3] in 1994.

A Feasibility Committee was established shortly after, to look at setting up an invertebrate conservation body, with a 'Statement of Need for a New Organisation' being produced. Twenty of the leading conservation organisations at the time (including the RSPB and The Wildlife Trusts) acknowledged that the conservation movement lacked a major spokesperson for invertebrate conservation; welcoming the establishment of one.

In December 2002, 'The Invertebrate Conservation Trust' registered as a company; the first organisation to bring together and represent everything concerning invertebrates. Two years later, the first member of staff was employed, our now CEO Matt Shardlow, and the organisation's name metamorphosed into 'Buglife – The Invertebrate Conservation Trust'.

Since this time, Buglife has championed invertebrates; making sure that they, and the habitats they rely on, are not forgotten. Raising awareness, campaigning, carrying out project work, promoting citizen science, producing and contributing to reports and policy…the list goes on.

A now constant reminder that bugs, critters, insects, whatever you choose to call them, should not be overlooked.

For the past 22 years, Buglife has advocated for the often indiscernible, sometimes 'invisible', occasionally maligned, but always important and necessary, invertebrates and the places they call home.

**An ever-growing supporter base for bugs**

Situated in the UK, Buglife is represented by a dedicated staff and volunteer base across the length and breadth of England, Northern Ireland, Scotland and Wales; from Scilly to Shetland and all the places in between.

But Buglife isn't limited to working within the UK. With a global social media following; a loyal and ever growing individual, family and life membership base and having previously worked overseas in South Georgia, Sri Lanka, St Helena and Tanzania, Buglife acts overseas where there is a need for our help. Particularly to prevent the extinction of a species or to help research how to create the conditions for sustainable populations.

We have an unusual structure, representing our origins. Buglife members (who attend the AGM and vote on motions) are the Trustees[4] and 37 member organisations[5] (including the Coleopterists Society of Britain & Ireland, British Arachnological Society and The Wildlife Trusts); in recent years member organisations have also joined from overseas.

In turn Buglife is also a member of a collection of other organisations, including the National Biodiversity Network Trust, European Habitats Forum and Wildlife and Countryside Link to name but a few. All of which help increase the reach and impact of our work; ensuring that bugs have a champion, a platform, a voice, whenever our natural world is being discussed. But why?

**Why is it so important and what is the point of insects?**

It is generally accepted that all life on earth has a purpose but, for some reason, many people still really struggle with that in practice; particularly when it comes to bugs. Often finding them scary, or annoying, viewing them as pests and proclaiming their pointlessness; even the ones that have 'media friendly' personas such as the honey bee or butterflies. Throw wasps, spiders or mosquitoes into the mix and the exclamation "what purpose do they have?!" is often heard.



Wasps perform a vital ecological role – as pollinators and pest controllers. Image: Buglife

Science has shown time and again that insects, individually and as a collective, have many purposes and are far from pointless; delivering many 'essential services' that we, and many other species, couldn't live without. They pollinate plants, disperse seeds, cycle and recycle nutrients, speeding up decomposition; they create and maintain soil health structure and fertility, control populations of, and are a major food source for, other species. They have been front and centre in many scientific advances and, even now, are essential in a variety of medical treatments, from helping scientists determine antibiotic resistance to detecting tumours.

Insects form and create the biological foundations for pretty much all terrestrial ecosystems.

In short, as Sir David Attenborough succinctly said: "*If we and the rest of the back-boned animals were to disappear overnight, the rest of the world would get on pretty well. But if the invertebrates were to disappear, the world's ecosystems would collapse.*"

And who's going to argue with him?


**References:**

1. buglife.org.uk
2. buglife.org.uk/campaigns/no-insectinction
3. jncc.gov.uk/our-work/uk-bap
4. buglife.org.uk/about-us/board-and-trustees
5. buglife.org.uk/about-us/member-organisations-and-affiliations


.....


**Nikki Banfield** is Buglife's Communication Officer who lives and works remotely in the Isles of Scilly. A keen photographer and beach Womble, Nikki is inspired by the natural world and all it has to offer. There's always something new to learn or discover; every day's a school day!

**Contact:** buglife.org.uk

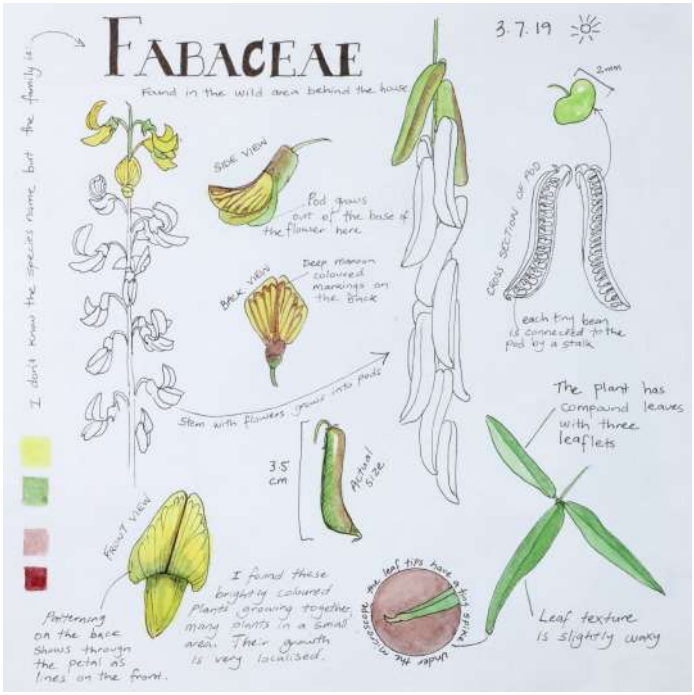
**More information:** info@buglife.org.uk


## Curiosity and connection through nature journaling


**Bethan Burton**


### What is nature journaling?

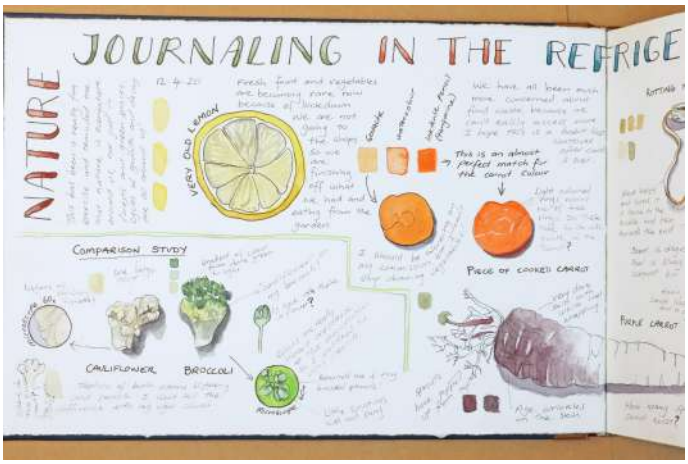
Nature journaling is recording your interactions with nature on paper. It can take many different forms and the journal pages of each person will be unique. You can use sketches, paintings, poetry, prose, species lists, numbers, graphs, cartoons and more. There are no rules. Connecting with nature is what is important, not creating a work of art.




### Why keep a nature journal?

People use nature journaling as a scientific tool, to understand the environment, connect with the seasons or keep track of what is happening in the garden. Others use it as a method of self-care, letting time spent in nature be a way to slow down, connect inwardly and find calm. Nature journaling can also be a family activity, getting everyone together for some focused family time, or it can be used in a school setting to touch a range of curriculum areas including science, maths, language, geography, art and cultural studies.

Whatever your reason for nature journaling, it all begins with curiosity. It is possible to intentionally cultivate curiosity, training your mind to open to the world around you and asking questions about your experience… Why is this leaf yellow? Where is this trail of ants going? What bird is that I can hear above me? When you cultivate curiosity, you begin finding wonder everywhere, even in places you might not have thought to look.

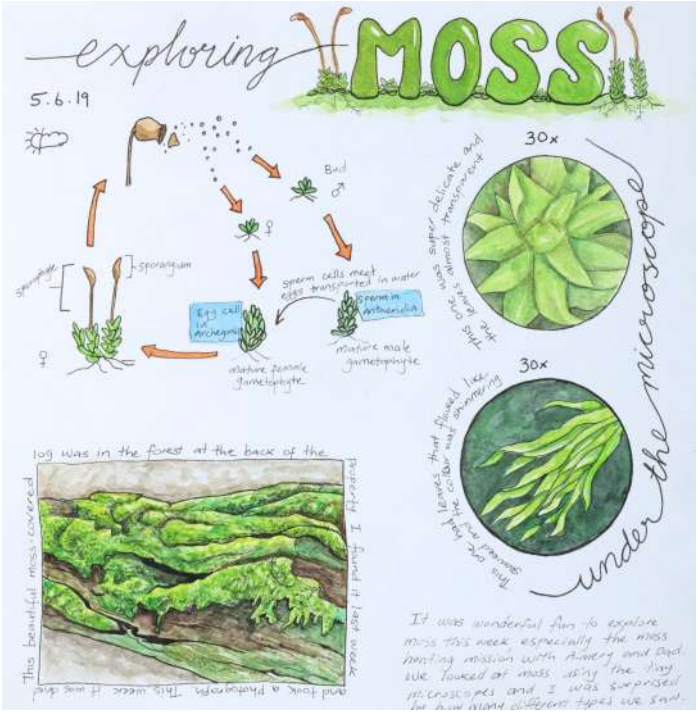



### How to keep a nature journal

To begin you don't need any fancy materials. You just need something to write with, something to write on and your curiosity!

Pay close attention to nature around you. Can you look at familiar things in a new way? Record your discoveries using a combination of words, pictures and numbers. Reflect on what questions this activity brings up. Write your questions on your journal page. You don't have to know the answer. Asking questions stretches your brain in new ways and further activates your curiosity.

Begin to experience the world through this lens of curiosity. Let yourself be open to seeing nature with new eyes. When you look with curiosity and wonder, the world around you becomes an infinite source of fascination and joy.




**Where to begin?**

For nature journaling resources, inspiration and encouragement, join the worldwide network of people participating in International Nature Journaling Week (1-7 June, naturejournalingweek.com). The inaugural event took place in 2020 and people from 93 countries around the world accessed the workshops and resources on the website. This year's event is going to be even bigger, with resources translated into various languages, live events each day and workshops accessible to everyone.

**Bethan Burton** is an artist and environmental educator from Brisbane, Australia. She teaches nature journaling to all age groups and is passionate about connecting people with the natural world. She is also the host of Journaling With Nature podcast and the founder of International Nature Journaling Week, an event designed to celebrate nature connection and nature journaling and to bring people together as a world-wide community.

**More information:** journalingwithnature.com
instagram.com/journalingwithnature
twitter.com/bewithnature
facebook.com/journalingwithnature

## Champions of biodiversity

### Jordan Allen & Allison Hands

BEAN is the Biodiversity Education and Awareness Network of Canada, where our correspondents are active board members. Here they explain to our Editor, Henricus Peters, the role of BEAN as an organisation and their respective roles as executive members in promoting biodiversity in their educational setting.

**What is your background/qualifications that led you to work with BEAN?**

**JA:** I originally became a BEAN co-chair while working at the OFAH Hunting and Fishing Heritage Centre[1] as part of my role as the Conservation Education Liaison. Prior to this position I went to Sir Sandford Fleming College for the Fish and Wildlife Technology Program and Trent University for Conservation Biology.

**AH:** And I first got involved in BEAN when I was the Education Coordinator at Ontario Forestry Association (now Forests Ontario). I was a Committee member starting around 2012 and Co-Chair from 2016 to 2020. I graduated from Trent University with joint major (honours) in Environmental & Resource Studies and Anthropology in 2007. As Education Manager at Forests Ontario I oversee all our forest education programs.

BEAN board members come from a variety of backgrounds in their personal lives, education and careers which was a great benefit to the network. In the past, BEAN's board has included members from environmental not-for-profit organizations, educational programs, government and school boards.

**What were your key responsibilities as Co-Chair?**

BEAN co-chairs were responsible for keeping board members to task, providing strategic leadership, vision and governance. They oversaw working groups within BEAN, coordinated regular meetings, reported activities to the Ontario Biodiversity Council, assisted with the development of educational resources to provide to teachers, maintained the website, and attended educational outreach events.

Each year a focus was placed on creating one new educational resource which supported the International Day for Biological Diversity theme.

Another key responsibility was to accept and grade applications, and award micro-grants up to $500 to individuals and organizations in the province of Ontario who were working to directly improve or teach about biodiversity. These grants went directly to hands-on projects that benefitted Ontario's biodiversity, such as creating pollinator gardens or removing invasive species, or supported events such as BioBlitzes that taught citizens about the biodiversity in their backyards and contributed to community science. When we still had capacity to support micro-grants, we were providing $10,000+ in funding annually, representing an average of 20 projects.

**What is your advice for someone coming new into the nature study field?**

I would advise someone entering the nature study field to try and gain as much different experience as they can. There are so many routes one can go in this field: from education, to policy, to research, and they are all so important. Volunteering is a great way to gain experience and can help someone determine what they would like to pursue. I would also advise them to fight for nature and not give up. Unfortunately, for many places in the world, biodiversity and nature isn't a top priority. We need determined people, especially in policy, to fight for our natural world.

Build a community and recognize small and large successes, understanding that the best solutions are long term and that change can be slow, even when we need it to be fast. There are lots of inspiring success stories and people doing important, impactful work. We also need all sorts, you don't have to have a science background to make an impact and get engaged.

**How and why did BEAN come about / begin?**

In 2005, the Ontario government made a strong commitment to biodiversity conservation through the development of Ontario's first Biodiversity Strategy[2] 'Protecting what sustains us'. At this time, the Ontario Biodiversity Council (OBC)[3] was created, along with 3 working Groups. BEAN was one of those working groups - set to achieve three key targets from the Ontario Biodiversity Strategy. These targets were:

1. Employ strategies to effectively communicate the relevance of biodiversity to the public.
2. Continue to integrate biodiversity education into all levels and types of curricula.
3. Develop and implement a Children's Outdoor Bill of Rights (the Ontario Children's Outdoor Charter[4]).

**What is the most challenging activity that BEAN undertakes?**

One of the biggest challenges BEAN has faced was the loss of government funding in 2018. When BEAN was originally created, the network received funding towards projects to help achieve the above targets. These activities included developing, producing, translating and distributing biodiversity-focused educational resources that were made available free to teachers. BEAN was also able to award micro-grants to events and projects in the province that directly improved or taught biodiversity.

After the loss of the funding, BEAN became solely volunteer-run, which provided its own challenges as members struggled to commit time to BEAN projects on top of their full-time positions at other organizations.

**What other nature groups does BEAN connect to?**

Not an exhaustive list but BEAN has worked with a number of partners in varying capacities including the Invasive Species Centre (recently provided website and resource development support), Forests Ontario, EcoSpark, Birds Canada & Key Biodiversity Areas Canada, Emerging Leaders for Biodiversity, Watersheds Canada and Streams Ontario to name a few.

We are also active on social media and have over 4,000 Twitter followers and 1,200 Facebook followers. Through social media channels, we work to promote our existing materials and to amplify messaging from other organizations working to protect biodiversity.

**What are the key education projects of BEAN?**

Production of biodiversity-focused resources for grades K through 12, you can find our current database of resources online[5]. We also work with partners in the environmental sector to create and share informative blogs on a variety of biodiversity topics.

**What is the Ontario Children's Outdoor Charter?**

The Ontario Children's Outdoor Charter aims to get children outside to discover the wonders of nature. Spending time outdoors is essential to every child's development, health and wellbeing. It builds a connection to our rich natural and cultural heritage. Kids connected to nature grow up caring for the Earth and helping to conserve biodiversity.

People, organizations, governments and communities that support the Charter recognize that time outdoors is important for children's health and wellness. Supporters of the Charter can promote it in their communities and improve opportunities for children of all abilities and backgrounds to play and learn outdoors.

**Why are nature and biodiversity important to you?**

That's a hard question! Nature, the natural world and by extension biodiversity is my hobby and passion. Biodiversity is how ecosystems function and thrive which in turn supports us. Pragmatically, while we have a responsibility to fix the mistakes of the past to protect (and where possible restore) ecosystem function, we also need to if we want to survive. Humans,, whether we like to admit it or not, are part of nature and natural systems – not apart from it. We will be (and currently are) impacted by the loss of ecosystem function and the degradation and decline of ecosystem goods and services.

But on a positive note, biodiversity is beautiful. It's weird. It's fascinating and wonderful.

Educating others about the importance of biodiversity, and our role as humans in the ecosystem, is one of the best ways to encourage them to play their part in restoring and preserving it. I believe that the more that people understand about the natural world around them, and the more they feel connected to it, the more they will do to protect it.

**Which wildlife websites would you recommend?**

- Ontario Wildlife Foundation ontwf.org
- Ontario Ministry of Natural Resources and Forestry ontario.ca/page/ministry-natural-resources-and-forestry
- Ontario Nature ontarionature.org
- Forests Ontario / Envirothon forestsontario.ca/en/program/ontario-envirothon
- Nature Conservancy Canada natureconservancy.ca/en/where-we-work/ontario/get-involved/learning-resources-for-kids.html

**Which biodiversity websites would you recommend?**

- National Environmental Treasure oursafetynet.org/about
- Key Biodiversity Areas Canada kbacanada.org
- Biodiversity Education and Awareness Network biodiversityeducation.ca
- Ontario Biodiversity Council ontariobiodiversitycouncil.ca
- iNaturalist database inaturalist.ca

**References:**


1. hfhc.ca
2. ontariobiodiversitycouncil.ca/ontarios-strategy
3. ontariobiodiversitycouncil.ca
4. childrensoutdoorcharter.ca
5. biodiversityeducation.ca

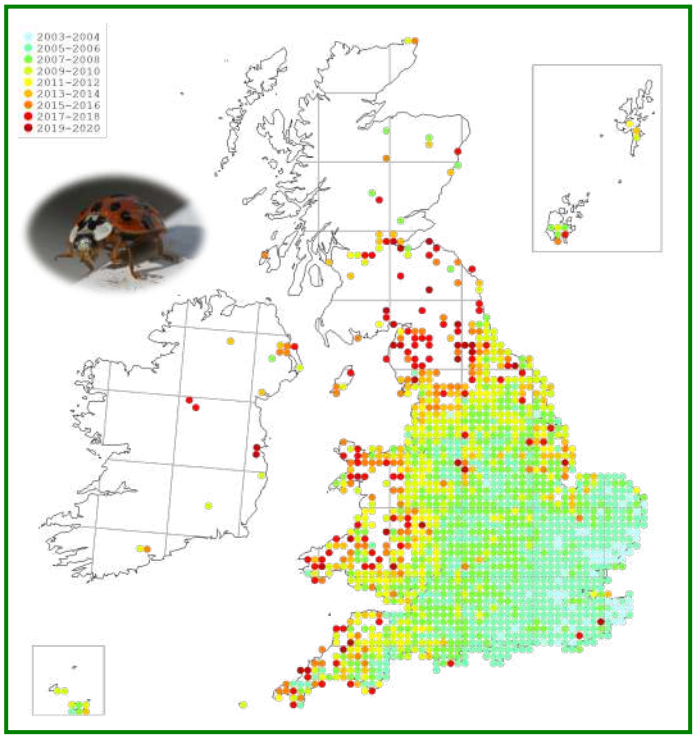
# Keeping biological records

Sam Amy

The Biological Records Centre (BRC), established in 1964, is a national focus in the UK for terrestrial and freshwater species recording. The BRC is supported by the Joint Nature Conservation Committee and the UK Centre for Ecology & Hydrology, a not-for-profit research institute which receives support from the Natural Environment Research Council National Capability fund. The work of the BRC is a major component of the National Biodiversity Network, which is a collaborative partnership created to exchange biodiversity information.

## Why do we need biological records?

Biological recording is the study of the distribution of living organisms, such as plants and animals. A biological record includes information about *what* organism was seen (e.g. species name), *where* and *when* it was seen, and *who* saw it. By collecting this information on many occasions across space and time, we can look at the distributions of organisms and how they change. By integrating with other data sources on the ecology of species and the physical environment, biological records data can be used to assess factors related to biodiversity change, such as climate and habitat change. This information is used to inform policy to reduce negative impacts, and support and monitor efforts to conserve and protect wildlife.




Map showing year of earliest record of the non-native Harlequin ladybird (*Harmonia axyridis*) for each 10km square in the UK and Ireland. Photo by Gilles San Martin, map by Steph Rorke, BRC.

## Supporting biological recording

BRC works in partnership with around 100 recording schemes and societies who each focus on different groups of organisms, aiming to improve how biological records are collected, made available, and used. Schemes are made up of many knowledgeable and enthusiastic naturalists, often working on a voluntary basis to identify the plants and animals they and others find. The biological recording community is extremely welcoming and supportive of beginners, and getting involved is a great way to learn about wildlife whilst contributing to understanding and protecting it. Find out more on our website[1].

The BRC develops technology to make recording easier and more inviting, with mobile apps and websites to help both beginners and experts. A few examples are listed below:

- **iRecord website and app:** Users can submit and keep track of biological records of all kinds, with an inbuilt system where records can be checked or 'verified' by an expert, before they can be used to make a vital contribution to scientific research, and which many of our other apps also link to. Users can set up their own 'activities' for others to use whist recording at a specific site or event.
- **What's Flying Tonight app:** developed in partnership with Butterfly Conservation and UK Moths, this app helps you identify the moths you see, based on your location and date.
- **Flower-Insect Times Count app:** part of the UK Pollinator Monitoring Scheme, ten minutes spent watching flowers and insects in good weather helps assess changes in abundance of wild pollinators.
- **Asian Hornet Watch app:** helps you identify and record this invasive non-native species which could have a serious impact on our native insects.
- **eSurveyor app:** helps farmers to assess the quality of the habitats they manage, using artificial intelligence to recognise plant species, and providing information on associated biodiversity.
- **iRecord Butterflies app:** developed in partnership with Butterfly Conservation, this app allows you to submit the butterflies (and some moths!) you see, including a guide to all UK species and image classification tool to help identify from photos.
- **iRecord Grasshoppers app:** helps identify and record the grasshoppers and crickets you find, including the ability to listen to and submit sound recordings of these insects.

The BRC is developing systems to better guide recorders to the most 'useful' places to record wildlife. This might be where not much recording has been done before, or where a return visit to try and record a certain type of animal would really improve our understanding of how they are faring.

## Using biological records data for science and conservation

The BRC shares data, on behalf of recording schemes, with other scientists and the wider public via the UK National Biodiversity Network Atlas[2], which anyone can explore. We also promote and publish printed and online Atlases for different taxonomic groups, which contain maps, species accounts and associated information to address a range of research questions.

The use of computer simulations of the recording process allows us to estimate accurate trends in species status over decades. We work with government agencies and partner organisations to develop biodiversity indicators which show whether things are

getting better or worse for our wildlife and inform on the UK's progress towards the Convention on Biological Diversity's (CBD) Aichi 2020 targets. These indicators, sadly showing widespread declines since the 1970s, can be found in the UK State of Nature Report[3], which also assesses the responses being made to try and conserve biodiversity.




Mobile apps are helping to make biological recording more accessible

**References:**

1. brc.ac.uk/getting-started-biological-recording
2. nbnatlas.org
3. nbn.org.uk/stateofnature2019/reports

.....

**Sam Amy** is a Botanical Data Assistant for the BRC at the UK Centre for Ecology and Hydrology (UKCEH). She supports biological recorders and ecological scientists in the management and use of biological records, helping to address a range of ecological questions. She previously spent many years as a UKCEH Field Ecologist, carrying out botanical and related surveys for research into factors affecting biodiversity in the UK.

**Contact:** brc@ceh.ac.uk

**More information:** brc.ac.uk

Biological Records Centre

## London Waterworks Park: a new blue space in London

**Matthew de Kretser**

The East London Waterworks Park (ELWP) is an ambitious project to transform an old, abandoned water processing facility into open-access swimming ponds for everyone to enjoy. The story of this site is complex, but a brief history goes as follows. During the 1800s and 1900s, the Lea Bridge Waterworks was a complex of 25 filter beds (which remove materials like oils and dirt from water to make it safe to drink). This water was then pumped to homes all around the area and provided thousands of people with clean water. In the 1960s, the site was considered redundant and a layer of concrete was placed over the filter beds. In 2019, a small group of residents wanted to see the space rewilded and open for the public to enjoy. They started meeting regularly and from this the East London Waterworks Park (ELWP) was born. The key aims are to create a place where people can swim outdoors, improve the biodiversity and wildlife in the area, educate people on the importance of biodiversity as well as the history of the site.

### Outdoor swimming

London is home to millions of people, but very few have access to safe and affordable swimming areas. This project will create the first new swimming ponds in London since Hampstead Ponds were built in 1777. Not only that,it will also be open-access, allowing more than 1000 people a day to swim for free. This provides opportunities for many people to access green and blue spaces. London summers are becoming increasingly hot, and having swimming ponds like these means that there is some natural respite from the heat. Studies have shown that swimming, and wild swimming in particular, has positive benefits for both physical and mental wellbeing.

### Biodiversity and wildlife

The site of this project forms part of the Lee Valley Regional Park, which covers more than 10000 acres, home to hundreds of species of birds and plants, and




Aerial photos before and after the development of the East London Waterworks Park.

thousands of species of insects. Once the swimming ponds are complete, they will connect this natural corridor within Walthamstow Marshes and provide a habitat for several important species such as the soprano pipistrelle bat, the common toad and the endangered marsh warbler. Birds that could breed on this site include the reed bunting and the willow, sedge and reed warbler.

There are several organisations campaigning to create more blue space across the country, including the Wildfowl and Wetlands Trust (WWT) and the Lee Valley Regional Park's Biodiversity Action Plan. It has been shown that marshes and wetlands store more carbon and attract more wildlife than woodlands or grassy areas of similar sizes. These ponds would cover approximately 5000 square metres, allowing for an abundant array of species to make it their home. ELWP also wants to create a wildflower meadow and a hibernaculum (a shelter for animals to hibernate in). This will support important pollinators such as the brown-banded carder-bee, the pyralid moth and the Essex skipper butterfly.

**Education**

Educating people on the importance of areas such as this one is at the centre of the project. This will be done through spaces on site dedicated to scientific research, arts projects and information about biodiversity and the history of the site. All of this will be housed in buildings that are original to the Lea Bridge Waterworks. To make the East London Waterworks Park carbon neutral and sustainable, these buildings will be retrofitted to improve their energy efficiency, and solar panels will be fitted to the roof. To provide the rest of the energy requirements for running the site, a vortex hydropower turbine will be installed in the historic turbine house. There will also be a repair cafe on site, promoting more circular practices and providing opportunities for upskilling.

The entire project, from start to finish, is also a chance for learning. ELWP is continuously partnering with universities and youth programmes to give young and underrepresented people opportunities and experiences to learn and grow. There are teams within ELWP that are dedicated to both learning and inclusivity, making sure that this project is benefitting as many people as possible throughout the process.

The East London Waterworks Park was formed only a few years ago, and although it is entirely volunteer run, there has been significant progress made. A crowdfunder is currently underway to purchase the land and move the project forward. This is an exciting and novel project and if all goes to plan, in a few years there will be new, open-access swimming ponds that positively benefit not only people, but also all the plants and animals around the area.

**Matthew de Kretser** is a charity worker living in London. He volunteers for East London Waterworks Park, which is a volunteer run organisation aiming to convert an underused concrete-covered depot site in east London into natural swimming ponds.

**Contact:** Nathan Miller nathan.miller@elwp.org.uk
Abi Woodman abigail.woodman@elwp.org.uk

**More information:** elwp.org.uk



An artist's impression of the proposed site.

## Zoos and biodiversity – the role of conservation education

**Tania Kahlon**

The way people interact, understand and connect with nature has a crucial role to play in sustaining our planet and in arresting biodiversity loss. Zoos and aquariums play a pivotal role in facilitating this interaction as they are spaces where people can experience nature in a manner that may not otherwise be possible. This is also what makes zoos and aquariums ideal sites for promoting conservation education, and for raising awareness about biodiversity, especially at a time when local and global biodiversity loss presents an urgent challenge. Conservation education can help to increase support for conservation and biodiversity through reaching a wide and diverse audience.

Simply understood, the term 'conservation education' is used to reflect that biodiversity conservation should be at the core of any educational activity delivered by a zoo or aquarium. However, understood more broadly, it may also include activities that make contributions to biodiversity conservation, such as education for sustainable development, biological, science or environmental education, ocean literacy, skills-based programmes, campaigns, and interpretation. This highlights its potential as a powerful tool to promote awareness on issues that directly or indirectly impact conservation and are

interconnected with sustainability. Thus, there is a need to recognise the importance of conservation education as being at par with animal care and welfare and conservation.

Research suggests that an estimated 700 million people visit zoos and aquariums each year. This highlights the opportunity that zoos and aquariums have in spreading awareness and generating action for biodiversity, conservation and more broadly, sustainability. Visitor surveys from across the world provide evidence[1] to indicate that visiting zoos and aquariums may result in a higher level of understanding of biodiversity as well as the visitors' ability to identify steps that they can take in order to help protect biodiversity. Thus, zoos and aquariums have the potential to play an important role in actively and effectively engaging their visitors to raise awareness and take action for biodiversity.

Conservation education highlights the scope that we are presented with when we combine the power of education and culture in transforming the way the public supports biodiversity and conservation. This support is pivotal at a time when there is a dire need to prioritise timely, ambitious, and coordinated action to address unprecedented and enduring changes to species, climate, ecosystems and communities.

**References:**


1. Jensen, Eric & Moss, Andrew & Gusset, Markus (2017). Quantifying long-term impact of zoo and aquarium visits on biodiversity-related learning outcomes. *Zoo Biology*. 36. 294–297. 10.1002/zoo.21372
2. WAZA. (2022). *Social Change for Conservation: The World Zoo and Aquarium Conservation Education Strategy* (in nine languages). waza.org/priorities/community-conservation/the-ize-waza-education-strategy



**Tania Kahlon** is the Communications Coordinator for the World Association of Zoos and Aquariums and works out of their Executive Office in Barcelona.

**Contact:** communications@waza.org


**The WAZA – IZE Partnership**

Understanding the need for conservation education in zoos and aquariums, the World Association of Zoos and Aquariums (WAZA) and the International Zoo Educators Association (IZE) signed a Memorandum of Understanding (MoU) in 2021. Through this collaboration, the aim is to enhance the capacity of WAZA's members in biodiversity conservation through communications, visitor engagement and a large variety of educational and interpretive programmes for all ages. This MoU is just one step that WAZA has taken to focus on conservation education, building on our Conservation Education Strategy[2] published with IZE in 2020.

## Shaping sustainable futures through education


**Matt Larsen-Daw**


To address the threats facing our planet, we need a fundamental change to the relationship we as humans have with it – and equipping our young people to shape that change needs to start now.

WWF is perhaps best known for the work it does around the world to protect and restore habitats and species that face threats to their future – often as a result of human activity. Our work with governments and local communities to tackle poaching and habitat loss across Asia has led to one of conservation's modern success stories; increasing wild tiger populations in India, Nepal, Bhutan, Russia and China after a century of decline in which numbers dropped by 95%.



Tiger portrait at Bandhavgarh National Park, India.
Francois Savigny/WWF

The global trend, however, is of declining wildlife populations. WWF's 2020 Living Planet Report showed that, on average, global wildlife populations have declined by 68% since 1970. Humans and our livestock now account for 96% of the mass of all mammals on the planet. Only 4% is wild animals – that's all the tigers, elephants, giraffes, badgers, rhinos, squirrels, polar bears combined.



African elephants in Amboseli National Park, Kenya.
Martin Harvey/WWF

The balance of the world has shifted away from the wild, and towards managed, human-defined landscapes and systems. Reshaping the world to ensure that it meets our demands for meat-rich diets, disposable commodities and fast, comfortable transport has brought short-term benefits for those who can afford them, or who

profit from supplying them. However, at a planetary scale we are destroying our own 'habitat'. The planetary system that supports us – providing us with the means to live comfortably, grow food and access to clean water – only works as a result of the rich biodiversity on land and water. Soil can only grow food if it is allowed to be a thriving ecosystem of microbes and fungi. Oceans can only supply food and absorb huge amounts of human-released carbon from the atmosphere if they host a complex web of life.



Spiny seahorse female in a meadow of seagrass, Dorset, England. Alex Mustard/WWF

All of this means that we cannot just continue to tackle threats to species or habitats at the local level but must instead bring systemic change to society and work to bring nature back.

This means a fundamental change to the way society operates, towards an economy that works for people and the planet. The future wellbeing of young people in education today depends on this, and they can and must play a key role in shaping that future.

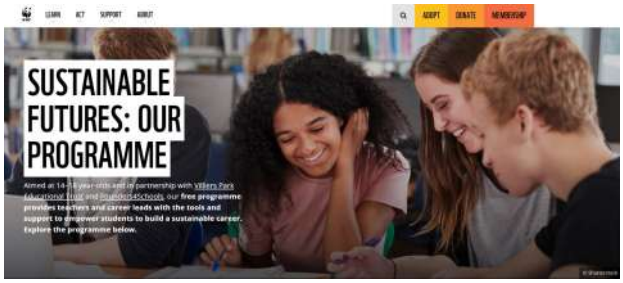
The change to 'business as usual' must be fundamental, and fast. Whether businesses are on the right side of history and realign their priorities to move to planet-friendly practices, or are forced to change as a result of environmental crises or strict new policies, they need to rethink success to include sustainability. This shift needs to happen across all sectors, because the fundamental principles by which we live and work need to change. This means that every business needs leadership and staff with an understanding of sustainability and how to apply those principles.

Sustainability should be at the core of our economy, including all lives and all careers. We need a strong influx of talent into conservation and the renewable energy industry, but it is also important that we have lawyers, fashion designers, coders, chefs and bankers who can bring a sustainable lens into their companies and sectors. Young people must be equipped with the skills, knowledge and experience for the new job market and green economy. This is currently lacking in careers guidance and support today.

To respond to these demands, WWF-UK, Villiers Park Educational Trust and Founders4Schools are launching a free UK-wide programme, Sustainable Futures[1], to equip young people to drive and thrive in the future net zero economy. The programme aims to:

- raise awareness about the relevance and importance of sustainability for future careers;
- build aspiration for sustainable skills and jobs and support employers to provide sustainable career pathway opportunities; and
- ensure *all* young people have equal access to sustainable career pathway opportunities and are encouraged to do so.

The programme seeks to embed sustainability into careers guidance in secondary schools and colleges, equipping young people to drive, and thrive in, a sustainable future. WWF and partners will also work with businesses to ensure that the career pathway opportunities young people demand are waiting for them, and that businesses are able and willing to recognise sustainable skills.




**Reference:**

1. wwf.org.uk/get-involved/schools/sustainable-futures

.....

**Matt Larsen-Daw** is Head of Education for WWF-UK, focused on leveraging the huge potential of education and schools to shape a sustainable future. Matt previously designed and delivered the global education programme around the *Our Planet* Netflix series and *David Attenborough: A Life On Our Planet*. Matt is also Chair of the socio-educational charity HVP Nepal-UK.

**More information:** wwf.org.uk/education
facebook.com/groups/learntolovenature

## Chronicles of Dunwich: an arts and environmental heritage outreach project

**Tim Holt-Wilson**

When I give talks I sometimes ask people whether there is nature on Mars. You can almost hear their minds whirring and clicking. The answer is 'yes', of course: we now know there are sands, boulders, dunes, gullies, mountains and other landforms. As on Earth, there are avalanches and dust storms (Williams, 2019[1]). Mars obeys the same natural, physical laws as on Earth.

If we think of 'nature' we almost always think of wildlife. This biocentrism is normal – after all, we are sentient organisms! However this 'nature' also includes geology and landforms, and all the abiotic processes such as the carbon and water cycles which implicitly frame and maintain the living world. It comprises the purely physical geo-, hydro- and atmospheres. How can we bring this abiotic world into awareness? How can we adopt a whole-Earth perspective on 'nature'?

One way is to focus on geology. I usually call it 'environmental history', for that is what it is. Rocks contain the mineral and fossil record of the past Earth and its life-forms. We can also focus on geomorphology: the landforms such as river valleys and cliffs which create the Earth's surface, and the variety of active and past



An iron-stained flint cobble forms a substrate for questing ivy (*Hedera helix*). Image: Tim Holt-Wilson

processes which have shaped it. In doing so we have to adopt a vastly enlarged timespan: geology touches on the origins of the Earth 4.6 billion years ago, and all the times between now and then. Many landforms have taken hundreds of thousands of years to evolve. We may call the variety of the Earth's abiotic features its 'geodiversity'.

My specialism is conserving and communicating geodiversity and its place in nature. When Stephanie Hartick, director of Art Branches[2], asked me to become involved in their work, I jumped at the chance. Art Branches is a Community Interest Company which engages people of all ages with their environmental heritage through the medium of the arts. Client groups have included young carers and people recovering from mental health problems; some are referred by 'social prescribers', for example health service practitioners.



Greyfriars, Dunwich, showing ruins of the refectory building and the priory gates beyond. Image: Tim Holt-Wilson

The latest Art Branches project is called 'Chronicles of Greyfriars'. Based in Dunwich (Suffolk, UK), it has attracted funding from the National Lottery Heritage Fund for a two-year project (2022-23) to bring the ruins of the mediaeval priory complex of Greyfriars and the nearby Leper Chapel to a wider audience. It is being run in partnership with Dunwich Greyfriars Trust and Dunwich Museum. Dunwich is a fascinating place: it was once one of the biggest port cities in Britain until it was progressively destroyed by storms and other natural processes. A small village remains, along with a few ruined buildings. It is a reminder of the threat to our own coastal cities from sea-level rise.

Greyfriars and the Leper Chapel were built in mediaeval times using a combination of stony rubble and imported masonry. They offer opportunities to see an extraordinary range of rock types – from locally-sourced flint cobbles to boulders of volcanic basalt; from dressed blocks of Jurassic limestone to chunks of Eocene cementstone. One could teach a whole geology course using examples just drawn from Dunwich walls! Among this material is a large proportion of ship's ballast sourced from far-away places such as Scotland and the Baltic (Burström 2017[3]). The walls are also home to an array of fascinating lichens, a few tenacious plants and some interesting animals.



Lichens at Greyfriars, with black fruiting bodies of *Opegrapha calcarea* contrasting with orange-yellow lobes of *Caloplaca flavescens.* Image: Tim Holt-Wilson



A harvestman (*Phalangium opilio*) trying to blend in to the mortar at Greyfriars. Image: Tim Holt-Wilson

The Art Branches approach is to use digital cameras and magnifying glasses in the field and microscopes in the classroom to draw people into looking closely and intently at environmental patterns and textures. Free art materials are provided, and expert tuition is available on how to get the best out of them. This approach was piloted and practiced over an earlier three-year period using other funding sources to engage people at other locations in Suffolk. 'Chronicles' workshops will be focused on clients categorised as socially 'vulnerable'.

The role of active sensory engagement with wildlife for promoting nature connectedness (over and above simply spending time in nature) has been emphasised by recent research. (Richardson, M., et al, 2021[4]).



Getting your eye in – young visitors at a 'Chronicles' pop-up event, August 2022. Image: Stephanie Hartick

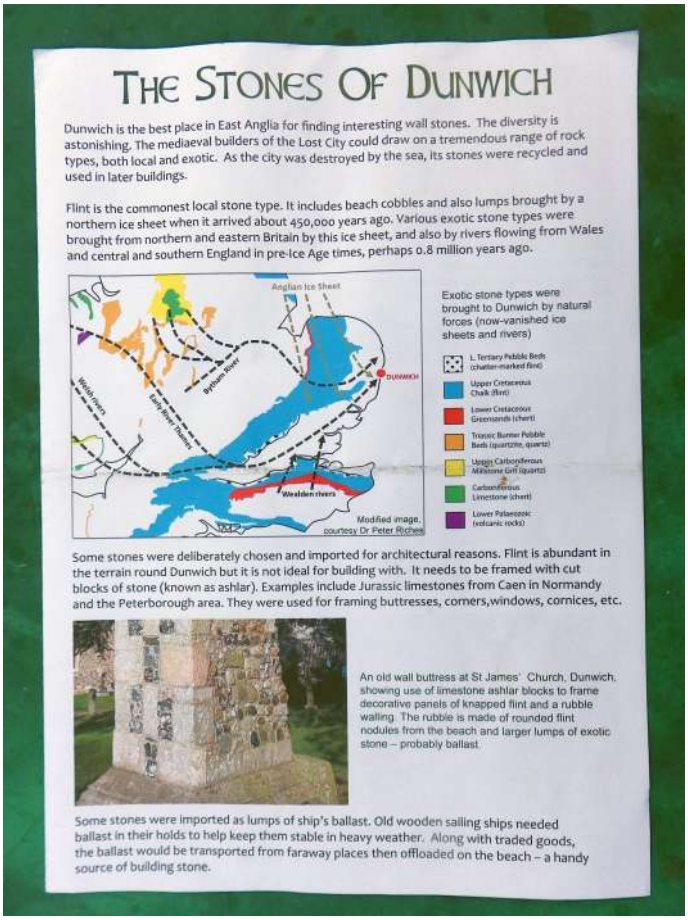


Getting artistic inspiration from fossils, bedding structures and textures in Jurassic limestone masonry at Art Branches workshop, Orford Castle, 2020. Image: Stephanie Hartick

Nature connectedness has implications for wellbeing as well as education. It is something which can be practiced in cities as well as the countryside. '*You don't have to be out in the wild to relate to nature. Nature connection can be simple, everyday and under our noses*' – Richardson, M. (2021[5]). For example, in Suffolk, one is rarely more than a mile or two away from a parish church, and most of them are mediaeval. As suitable building stone had to be imported, their builders made do with locally-sourced rubble of all kinds. It may be drawn from river gravels, coastal shingle and glacially-derived materials in plough soil. The result is a jumbled pudding of stones with great diversity, forming knobbly substrates and affordances for wildlife.

Gravestones are also an accessible source of interest – many of them made from exotic lithologies, and forming interesting substrates for lichen. The churches of Suffolk are thus portals to a wealth of educational and artistic inspiration which one can easily get up close to.

Art Branches resources for participants include a 'Churchyard Discoveries' leaflet and a 'Stones of Dunwich booklet'. A pull-out stone spotter's guide specifically for children is also planned.



THE STONES OF DUNWICH

Dunwich is the best place in East Anglia for finding interesting wall stones. The diversity is astonishing. The mediaeval builders of the Lost City could draw on a tremendous range of rock types, both local and exotic. As the city was destroyed by the sea, its stones were recycled and used in later buildings.

Flint is the commonest local stone type. It includes beach cobbles and also lumps brought by a northern ice sheet when it arrived about 450,000 years ago. Various exotic stone types were brought from northern and eastern Britain by this ice sheet, and also by rivers flowing from Wales and central and southern England in pre-Ice Age times, perhaps 0.8 million years ago.



Some stones were deliberately chosen and imported for architectural reasons. Flint is abundant in the terrain round Dunwich but it is not ideal for building with. It needs to be framed with cut blocks of stone (known as ashlar). Examples include Jurassic limestones from Caen in Normandy and the Peterborough area. They were used for framing buttresses, corners, windows, cornices, etc.

An old wall buttress at St James' Church, Dunwich, showing use of limestone ashlar blocks to frame decorative panels of knapped flint and a rubble walling. The rubble is made of rounded flint nodules from the beach and larger lumps of exotic stone – probably ballast.

Some stones were imported as lumps of ship's ballast. Old wooden sailing ships needed ballast in their holds to help keep them stable in heavy weather. Along with traded goods, the ballast would be transported from faraway places then offloaded on the beach – a handy source of building stone.

A simple two-fold A4 booklet explains the diversity of rock types in Dunwich walls and provides a pictorial guide to identifying 15 of them. Image: Tim Holt-Wilson

**References:**


1. Williams, S., 2019. *Winds of Mars: Aeolian Activity and Landforms*. Lunar and Planetary Institute. lpi.usra.edu/publications/slidesets/winds
2. artbranches.org
3. Burström, M., 2017. *Ballast. Laden with History*. Nordic Academic Press.
4. Richardson, M., Hamlin, I., Butler, C.W., Thomas, R. & Hunt. A.. 2021. *Actively Noticing Nature (Not Just Time in Nature) Helps Promote Nature Connectedness.* Ecopsychology, Mar 2022, pp.8-16.
5. Richardson, M., 2021. *Nature and Me – a new guide to strengthening the relationship between people and nature*. Finding Nature blog. findingnature.org.uk/2021/04/28/nature-and-me



**Contact:** timholtwilson@myphone.coop

To find out more about 'Chronicles' contact Stephanie Hartick artbranches@icloud.com

# Co-production and Youth Action Partnerships: introducing the 'Challenging the Climate Crisis' project

**Sara Williams, Rosamund Portus, Morien Robertson, Holly Preston, Oscar Reynolds, Islay Griffiths, Esme Pykett, Miranda Currie, Rowan Stranger, Lindsey McEwen**

To be a young person today is to face the prospect of an adulthood which is shaped by environmental breakdown and climate emergency. The declarations of Climate Crisis and calls to action are widespread[1,2,3,4]. Perhaps unsurprisingly, just last year, it was reported that many child psychiatrists in England are seeing children and young people becoming increasingly distressed about the climate crisis[5]. This year, in a study of 10,000 young people, it was found that over half of those surveyed were worried or extremely worried about the climate crisis[6].The knowledge that young people are at the forefront of the climate emergency, both as the demographic who will be most greatly affected by climate change, and increasingly as activists for change, was central to the development of *Challenging the Climate Crisis: Children's Agency to Tackle Policy Underpinned by Learning for Transformation*[7]. This project aims to examine how young people perceive and experience climate issues. The three-year international project, led by researchers in the University of the West of England, Bristol and with partners in Ireland, Finland and Italy ,involves a survey of over 2,400 young people, as well as creative, narrative work with young people, teachers, and other key actors who shape their learning. The research findings will make a significant contribution to our understanding and appreciation of young people's views and experiences, and will lead to policy-based recommendations and resource toolkits for developing climate education in different cultural settings.

A critical and unique aspect of this project is that the research is being developed through the 'eyes and ears' of young people. What this means in practice is that young people from between the ages of 15-18 have been recruited in each national setting as co-producers of the project, forming four 'Youth Action Partnership' (YAP) groups. The decision to engage young people as co-producers stems from the understanding that it is not only essential that children and young people are given a voice in matters which affect them (as detailed in the United Nations Convention on the Rights of the Child[8]), but that co-producing research with young people is a meaningful way to ensure any research outputs are genuinely relevant to communities of young people[9,10]

This article, which was written co-productively with YAP members in Bristol to introduce the CCC-Catapult project, has been produced in the early stages of the YAP process. Its intention is not to reflect on the experience as a completed process, but to consider how the early stages of this process have been navigated, and to voice from the outset of this project the intentions of both YAP members and researchers, as we collaboratively undertake, navigate and develop the emergent YAP experience.

## Forming YAPs

Recruitment for the YAP group in Bristol began in June 2021. Significant efforts were made to attract diverse group membership, and the researchers contacted community groups and organisations focusing on areas that do not traditionally attract young people into university-level research projects. However, connecting with 15-18 year olds across Bristol during the Covid-19 pandemic – a time when schools had to close and young people were coping with significant changes and trials[11] – proved a challenge; not being able to directly interact and speak with young people limited opportunities for meaningful engagement. It was with the help and enthusiasm of community organisations and schools across Bristol that researchers on the project team had the chance to engage with young people, and by August 2021, form a group of nine YAP members*****. This core group will likely gain more members as the project engages diverse groups across Bristol. YAP members are meeting monthly, either online or face-to-face in locations around Bristol such as The Arnolfini[12] and Future Leap[13]. It is during these monthly meetings that YAP members are guiding, and will continue to help guide research activities, contributing to the methodological development, the co-analysis of project data, connecting with project stakeholders, and collaborating on research outputs. In addition to the monthly meetings, YAP members are keeping individual reflective journals, which will explore their own learning and development as climate ambassadors, and which will selectively form part of the research data.

***** Recruitment for this group is ongoing. For more information, contact rosamund.portus@uwe.ac.uk

## Hopes and expectations

When discussing their expectations and hopes for their involvement for the research project, YAP members voiced a few key reasons for their involvement. The first key reason centres around a desire to be involved in a research process, which will contribute towards meaningful change in the climate education and policy sectors. YAP member Islay, for example, expressed her hope to *"create real change by being part of the climate education movement".* Likewise, YAP member Morien "*would like to help contribute to the production of useful climate data and reports".* Morien's hope is that *"the end result of this project will be the development and amplification of young people's views on the issue of climate, as [he] thinks this is a much needed and underheard perspective".* Having the opportunity to engage with this research project as a YAP member provides young people with the unusual chance not just to help develop a large-scale research project, but to see how the outcomes of that project are shared and used. As YAP member Miranda states, she would like to help develop some first-hand research, and be able to see how research she has been *"involved in shaping and creating […] in an article or in a secondary way".*

The second key reason YAP members expressed for being interested in the CCC-CATAPULT project centres around the opportunity it provides for personal development and knowledge growth. YAP member Rowan, for example, spoke of how she joined *"to learn more about climate issues and how we can make a difference as individuals".* YAP member Holly expressed an interest in capitalising on the YAP experience as an opportunity to develop skills which will allow her to develop her career in the sustainability sector, using this as a chance "*to find out about what types of careers there are to do with climate change or sustainability".*

Indeed, a core focus for the YAP experience is that it offers pathways for personal development – through providing YAP members with opportunities for learning, training, and professional experiences. It is hoped that the YAP experience will not only empower YAP members to become ambassadors for change, but provide them with the tools they need to follow their personal interests through their future.

The final reason YAP members stated for their interest in joining the YAP programme was through their interest in learning from, and developing, networks with other young people, whether this be at a local or international level. YAP member Esme, for instance, expressed an interest in learning *"what other young people think about climate change based on where they live".* Likewise, YAP member Oscar believes that the YAP opportunity will be *"a great opportunity to meet groups in other centres".* Having the opportunity to develop connections with other young people interested in environmental change will be a significant focus of the YAP experience going forward. For instance, to encourage the development of local networks with diverse young people, a climate sharing event is being planned by Bristol-based YAP members and project researchers in conjunction with a local community organisation partner. This event will invite young people across Bristol to come and share in conversations about climate change, learn about some of the local projects and initiatives happening around Bristol, and connect with others who might share their concerns and interests. Within the CCC-Catapult project itself, YAP members in Bristol will soon be participating in virtual international meet-ups with YAP members from other countries, where they will have the opportunity to form connections that will lead to opportunities for international collaborations.

**Opportunities and challenges of co-production**

The CCC-Catapult research team is committed to co-production of research. There are multiple benefits to this approach. It is more relevant and practically applicable, can build connections between academic research and the public, and can produce more rigorous results[14]. Co-production is also empowering and potentially transformative for those involved, providing opportunities for young people to meaningfully engage with an impactful research project and recognise their own capacity as researchers [15, 16, 17].

Co-production differs from youth-led research and it poses challenges for both parties involved. For researchers, it means taking a back seat at times in the research process, allowing for other voices and expectations to shape their work. For young people, it means providing energy and time. There is also the tension between expertise and autonomy and the levels of guidance. Researchers are experts in their academic fields – equality in knowledge cannot be fully reached, skills, perspectives and experiences are brilliantly different, and that is not the aim. However, it is the researchers' responsibility to carefully communicate, to craft, facilitate and guide young people with the ultimate aim of authentically providing a platform for them to contribute, shape and influence their futures.

**Conclusion and future plans**

Research co-production through partnership with young people is an ambitious aim of the CCC-Catapult project, and it is a challenge for all involved. Fortunately, the benefits outweigh the challenges, and the research which is produced (in both process and outcomes) will be far more meaningful for those it is intended to help. This is not only an opportunity to co-produce research. We are approaching this project as a unique opportunity to develop a collaborative working relationship that will lead to further opportunities for change, and that will support wider youth-led climate action across Bristol and beyond.

We are at the very beginning of this collaborative journey. However, YAP members in Bristol will be working with researchers for the next two years, and possibly beyond. Over this time, they will be engaging with both the CCC-Catapult project and other relevant events and activities. For example, in 2021, we ran a 'Climate café, Conversation and Cake' event in Easton, Bristol. Future updates on the YAP process will be communicated through our Instagram[18] and Twitter[19] pages, and further information can be accessed through the project website.

.....

**References:**


1. Intergovernmental Panel on Climate Change (2021). *Climate change widespread, rapid, and intensifying – IPCC*. tinyurl.com/5a2dwufj
2. UN Environment Programme (2021). *Young people call for urgent climate action at UN Environment Assembly.* tinyurl.com/52p6sw8j
3. Harvey, F. (2021). A million young people urge governments to prioritise climate crisis. *The Guardian.* tinyurl.com/42yrnuf8
4. Wu, J., Snell, G. and Samji, H. (2020). Climate anxiety in young people: a call to action. *The Lancet.* tinyurl.com/52hpan6p
5. Watts, J and Campbell, D. (2020). Half of child psychiatrists surveyed say patients have environment anxiety. *The Guardian.* tinyurl.com/3nfknyv9
6. Hickman, C., Marks, E., Pihkala, P., Clayton, S., Lewandowski, R.E., Mayall, E.E., Wray, B., Mellor, C. and van Susteren, L. (2021). Young people's voices on climate anxiety, government betrayal and moral injury: a global phenomenon. *The Lancet.* tinyurl.com/yzsnz7cn
7. CCC-Catapult. (2021). *Welcome to the CCC-CATAPULT Project!* CCC-Catapult. ccc-catapult.org
8. UNICEF (1989). *The United Nations Convention on the Rights of the Child*. tinyurl.com/43mr8v87
9. Lundy, L., McEvoy, L. and Byrne, B. (2011). Working With Young Children as Co-Researchers: An Approach Informed by the United Nations Convention on the Rights of the Child. *Early Education and Development*. tinyurl.com/4bw4fhcx
10. Pavarini G.,Lorimer, J., Manzini, A., Goundrey-Smith, E. and Singh, I. (2019). Co-producing research with youth: The NeurOx young people's advisory group model. *Health Expectations*. tinyurl.com/yvykwjkn
11. Rajmil, L., Hjern, A., Boran, P., Gunnlaugsson, G., de Camargo, O.K. and Raman, S. (2021). Impact of lockdown and school closure on children's health and well-being during the first wave of COVID-19: a narrative review. *BMJ Paediatrics Open.* tinyurl.com/y9d2knrr
12. The Arnolfini. (2021). *ABOUT.* arnolfini.org.uk/about
13. Future Leap. (2021). *Home*. [Online]. Future Leap. futureleaphub.co.uk

14. Campbell, H. and Vanderhoven, D. (2016). *Knowledge That Matters: Realising the Potential of Co-Production*. N8/ESRC Research Programme. tinyurl.com/3pvvear3
15. Cuevas-Parra, P. (2020). Co-Researching With Children in the Time of COVID-19: Shifting the Narrative on Methodologies to Generate Knowledge. *International Journal of Qualitative Methods*. tinyurl.com/mvr7d57s
16. Pavarini G.,Lorimer, J., Manzini, A., Goundrey-Smith, E. and Singh, I. (2019). Co-producing research with youth: The NeurOx young people's advisory group model. *Health Expectations*, 22(04). tinyurl.com/48b5vjn2.
17. Durose, C., Beebeejaun, Y., Rees, J., Richardson, J. and Richardson, L. (2012). *Towards Co-Production in Research with Communities*. Connected Communities, Arts and Humanities Research Council. tinyurl.com/4ev4jcrj
18. *Challenging Climate Crisis*. instagram.com/challenging_climate_crisis
19. CCC-CATAPULT. twitter.com/CCC_CATAPULT

This project is funded in the UK through the ESRC and is part of JPI SOLSTICE programme.

The writers acknowledge the contribution of all other members of the CCC_CATAPULT consortium in their collaborative project development (visit ccc-catapult.org for a full list of all the members of the consortium).

## Invasive alien Nile tilapia in the Limpopo and Mpumalanga Provinces of South Africa

**Dr Mandla Magoro & Lucky Dlamini**

Invasive alien species are a major threat to South Africa's biodiversity as the uncontrolled introduction and spread of invasive species to ecosystems and habitats, where they do not naturally occur, can cause harm to the environment and to biological diversity in particular.

### Understanding invasive species

Responding to the need to understand invasive species, a collaborative project between the NRF–South African Institute for Aquatic Biodiversity, the South African National Biodiversity Institute and the Department of Forestry, Fisheries and Environment is underway to determine the current extent of the spread of the invasive alien Nile tilapia (*Oreochromisniloticus*) in the Limpopo and Mpumalanga provinces. This is because its invasions can result in hybridization with native tilapias such as the Mozambique tilapia (*Oreochromismossambicus*), but it is also the most favourable species for warm-water aquaculture, a sector which despite considerable attempts at development has remained stagnant. Current knowledge of the Nile tilapia distribution is therefore essential and needed for well informed biodiversity management and decision-making.

### Conflict species

*"The complication to South Africa's ecosystem is that it consists of species that are economically valuable but also cause harm to biodiversity. Such species are called conflict species, as the different value associated with them results in considerable conflict with other ecosystem species,"* said Dr Mandla Magoro, one of the leading researchers in the Nile tilapia project and Postdoctoral Researcher at the South African Institute for Aquatic Biodiversity. In South Africa, conflict species are typically angling species such as trout, largemouth bass and carp, or aquaculture species such as Nile tilapia.

According to Dr Magoro, effective management of South Africa's conflict species is hampered by incomplete knowledge which has resulted in decisions being made based on expert opinion rather than on the basis of strong scientific knowledge. *"This constrains the effective development of management strategies and weakens the national response by public organisations who oppose the AIS [Aquatic Invasive Species] regulations and strategy,"* explained Dr Magoro. Thus, the regulation of conflict species requires proactive approaches to management such as the proposed zoning scheme on national maps, which include permitted and prohibited zones for AIS.



The Olifants River near Phalaborwa, Limpopo Province.

The filling of these knowledge gaps about conflict species and developing scientific data to support decision making will become a major component of the National Invasive Species Strategy and Action Plan which is under development by the Department of Forestry, Fisheries and Environment and one of the important species defined as a priority in this Plan is the Nile tilapia.



*"Escaped Nile tilapia are cross-breeding with local varieties, posing a threat to biodiversity and the growth rates of farmed fish."*
The Fish Site (tinyurl.com/3v96a6yc) Image © Prof Martin Genner

**Expected impact**

The project will produce an up-to-date map of the current distribution of Nile tilapia in the rivers and dams of the two provinces, whilst also revealing key areas currently inhabited by pure strains of the native Mozambique tilapia. The project addresses the Sustainable Development Goal 2 aimed to achieve 'zero hunger' and to contribute to food security and improved nutrition. This will be achieved as the data collected during this project will inform policy on future freshwater aquaculture developments and activities in the Limpopo and Mpumalanga provinces. Aquaculture plays an important role as far as the country's food security is concerned, and this study will aid in the process of demarcating zones where use of Nile tilapia will be permitted for use in aquaculture facilities, with prospects for job creation.

**Field collection**

Field data collected at selected sites will determine the presence or absence of Nile tilapia, or their hybrids. To date, Dr Magoro and colleagues have completed two months of field work in the Limpopo and Mpumalanga provinces. The initial agreement was for the team to sample 100 sites, but they have managed to surpass this figure by sampling more than 40 additional sites. The second phase of the project will involve the use of molecular genetics to confirm morphological identifications and to determine the presence of hybrids. *"This phase will allow for a more robust determination of the current distribution of pure Mozambique tilapia, non-native Nile tilapia, as well as hybrids of the aforementioned species,"* said Dr Magoro.



Dr Lubabalo Mofu deploying a cast net at the Noordsand River in Hazyview, Mpumalanga.



Sampling for Mozambique and Nile tilapia at Oreochromis at Heyshope Dam, Mpumalanga Province.

Dr Magoro's role in this project includes being part of the field survey team (tasked with planning, implementation and stakeholder engagement), specimen and data management, as well as managing all the reporting activities (tilapia meetings, technical reporting and data management).

**Research team**

The project team includes collaborators between the NRF–South African Institute for Aquatic Biodiversity (NRF-SAIAB), the South African National Biodiversity Institute (SANBI) and the Department of Forestry, Fisheries and the Environment (DFFE). The SAIAB research team consists of Dr Mandla Magoro, Dr Albert Chakona, Dr Angus Paterson and Dr Lubabalo Mofu.

**Dr Mandla Magoro** is a Postdoctoral Researcher at NRF-South African Institute for Aquatic Biodiversity. As well as Dr Mandla Magoro's main research work on mapping the current distribution of invasive alien Nile tilapia in the Limpopo and Mpumalanga provinces, South Africa, he is currently involved in a Food and Agriculture Organization (FAO) of the United Nations Illuminating Hidden Harvests country case-study that seeks to elucidate the current contributions, impacts and drivers of change in small-scale fisheries at the national and international level.

**Lucky Dlamini** is the Communications and Stakeholder Relations Manager at NRF-South African Institute for Aquatic Biodiversity.

## Curious connections – working across borders to protect the world's slowest mammal

**Katra Laidlaw**

*"How would a sloth cross a bridge?"*

Immediately, several hands fly into the air. I glance about the group of pre-schoolers seated around me, searching for the quietest and most sloth-like among them. I see a pre-schooler trembling with silent excitement, her hand lifting higher with each passing moment. I call upon her and she leaps to her feet and dashes to the centre of the circle. Then, putting on her best sloth impression, she begins to move at a glacial pace. Grasping the rope with two fingers at a time, she pretends to dangle upside down, steadily and patiently making her way across the makeshift rope bridge.

*"Do you remember why we are installing this rope bridge?" I ask.*

*"For the monkeys and the sloths!" they answer, without skipping a beat.*

*"Yes, so the monkeys and the sloths can get across safely,"* I reply, pointing to the gap between the trees.

I give a thumbs up to our tree climber, and with that he starts to pull the rest of the rope up into the tree. The rope steadily rises into the air and the bridge starts to take form. Some of the pre-schoolers sit transfixed, watching as the rope lifts into the air, while others are

more preoccupied with prodding the plants growing underneath them.

It is unclear exactly what these young children may remember about this bridge-building day. Will they remember pretending to cross a rope bridge like a monkey? Will they remember the man high up in the tree? Whether or not they will be able to remember details from this day, one thing is certain, that by being immersed in nature, it quickly gets folded into the fabric of their worlds. And moreover, by putting themselves in the paws or claws of other creatures, they are also laying down the building blocks of respect and empathy for the natural world.




Image of a sloth caught on a camera trap at one of the bridges.
Image: slothconservation.org

A little way up the road from this preschool in Puerto Viejo, Costa Rica, is the Cahuita National Park; a sanctuary for a variety of marine and terrestrial species that call the Caribbean coastline their home. Looking a bit out of place in our field gear and our conspicuously large antenna, we wander around the neighbourhood, trying to follow a weak signal among the houses. We are searching for radio-collared sloths that were hand-reared and recently released in the vicinity.

Our search leads us to a family-run hotel which backs onto the national park. Calling across the fence, we ask, "*Han visto la perezosa*? (Have you seen the sloth?). *"Si! Ella estaba durmiendo en ese árbol. Entren!* (Yes! She was sleeping in that tree. Come on in!). He opens the large wooden gate for us, prompting us to follow. His young daughters emerge from the house to say hello, now accustomed to the curious sloth people that come to their home every few days. We arrive at the tree where the sloth had been feeding the night before, only to find it empty. "*Vi el perezoso usando los cables*!" (I saw the sloth using the cables) the older of the two daughters pipes up, pointing to the cables nearby. Concerned by this news, we look to the telephone cables and uncovered electric wires she is pointing to, running just beyond the fence of the family's home. Thanking the family for their time, we offer two sloth activity books to our young sloth trackers who eagerly take them back inside.

Monitoring sloths living in urban conditions has turned out to be more challenging than we originally thought. The radio-telemetry signals coming from the sloth's collars ricochet off the buildings, giving us false positives and generally confusing readings. It is thanks to the efforts of compassionate community members, such as the family that owns the hotel, that we have been able to closely monitor these urban-dwelling sloths. And in the case of the hand-reared sloths, following them closely is crucial, as it will determine whether or not they are developing the skills to live on their own. Recently, we have expanded our urban sloth monitoring to the Puerto Viejo area, collaring new sloths every few months and getting to know our neighbours a bit better in our quest in finding these elusive creatures.

As was the case for many grassroots organizations, COVID-19 meant halting our operations on the ground. Our on-site educational programs ended as schools sent their students home and shut their gates. But that did not slow down our sloth education. We uploaded our sloth activity workbooks online and our dedicated Director of Education, Sarah Kennedy, took to the virtual realm, offering free Zoom classes to students quarantining at home.

Among the most enthusiastic responses was from the Girl Scouts. Over 2000 Girl Scouts participated in our sloth education in 2020. Although many of them had never seen a sloth in person, they were concerned by the variety of problems that sloths face, and decided to help raise awareness and funds for many of our projects! Thanks to their enthusiasm and perseverance the word certainly got out, and over the course of 2020 they helped to amass an army of young conservationists!



Three-fingered sloth crossing one of the bridges.
Image: slothconservation.org

Often, and rightly so, the focus of environmental education is evaluating the impact of the programs on the children's development. However, the flip side of environmental education is the lasting impact that interacting with youth has on the educators. I am saddened by the idea that these kids are growing up in a world where sloths and other wildlife require bridges to navigate increasingly fragmented habitat. But their infectious energy, curiosity, and failure to see obstacles, gives me hope. This is a generation that is accustomed to accessing a world of information at their fingertips. If anyone will be equipped to reconnect us and our planet, it will be them.

**Katra Laidlaw** is the Sloth Crossings Manager for the Sloth Conservation Foundation, helping to re-establish connectivity for vulnerable arboreal species in the South Caribbean of Costa Rica.

**Contact:** katra@slothconservation.org

**More information:** slothconservation.org

# BOOK REVIEWS

## *By Ash, Oak and Thorn*
## *By Rowan and Yew*
### Melissa Harrison







I had the precious pleasure of reading these two story-books to my child over the past 4 months. It has been a joyful and at times tearful experience for us both. Melissa Harrison has written a meditation on the English countryside, in my view on a par with the adventures of Pooh and Mole of old but with a modern sensibility that rejuvenates some of the world's greatest tales in the service of a new generation of readers. Her narrative centres on the Hidden Folk, imaginary little people who embody the idea of Earth guardianship, drawing on a range of myths and legends and indigenous beliefs including the god Pan, the Satyrs and many more besides. The story unfolds as an epic; an adventurous journey from country to town, and back (even including a stretch on water) and has as its central tenet the idea that domestic gardens can regenerate biodiversity on an ailing planet. I have a similar conviction about the potential of gardens in villages, towns and cities. In trying to live by the courage of my convictions about the wonders of a messy garden to solve the biodiversity emergency I have had to train my eyes and heart to love the 'weeds' that grow through the pavement cracks outside our house and are slowly diversifying the front patch that a previous tenant covered in horrid white synthetic gravel. I had been working on that shift in consciousness for a while before I read this book because I know how important these clever little plants are for the myriad of tiny creatures that live off and in them. But my eyes have been encultured into seeing these so-called weeds as out of place and ugly, and my hands have itched to pull them up. These tales have helped these plants to shimmer and shine in my eyes, and I love them, and this author, for that. On diversity of a different kind, as I read this book aloud, it slowly dawned on me that her central characters are gender neutral. She has managed to do this so naturally that I did not notice until we were half-way through the first book, and then I had to go back to make sure we were right; entailed in this as a lovely conversation about the importance (or not) of gender between me and the child I call my own. I wonder if you (potential reader) would have noticed it at all if I had not mentioned it? I would tell you more but I would hate to deprive you of the joy (and sweet sorrow) of arriving at the end of this tale in your own way so I will resist.

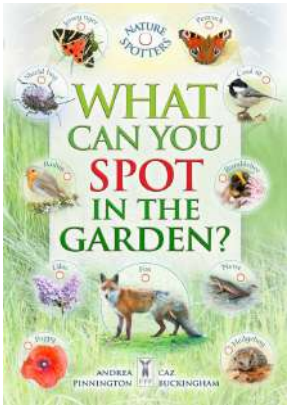
I will end on this point: the story makes a gentle gift of grief to you, holding it out to you so you can look at its form and shape from different angles before you decide you will accept it. This is grief that does not come wrapped in anxiety and depression, but in hope; it is grief that is allowed to run its course and as such it is healing. My child and I will read this book again, I got so engrossed in the tale that I hurried the last chapters and they lost track of the plot a little. I cannot wait for us to re-embark!

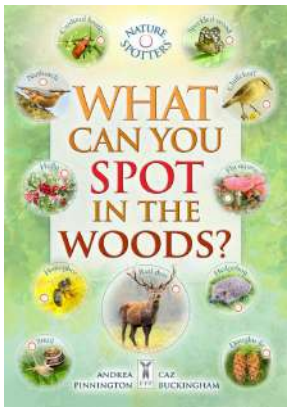
P.S. I wonder if the author knows her name means 'bee'? I suspect so… our names are seldom accidental, as these tales lead you to an understanding of this.

**Harrison, M. (2021). *By Ash, Oak & Thorn;* ISBN 978-1913322120. *By Rowan & Yew;* ISBN 978-1913322137. Frome: Chicken House Publishing Ltd. Paperbacks. melissaharrison.co.uk/books.**

**Reviewed by Elsa Lee**

## *What can You Spot in the Garden?*
## *What Can You Spot in the Woods?*
### Andrea Pinnington & Caz Buckingham




*"Did you know? A mole has a venomous bite which it uses to paralyse worms. This keeps the worms fresh and alive to eat later."*

Guest author Ben Hoare has collaborated with writers/illustrators Andrea Pinnington and Caz Buckingham on this set of *Nature Spotters* books (also coming soon are books about seashore and meadow wildlife). Each book is divided into themes, such as birds, insects and trees; and each section begins with a short quiz, which I would recommend children revisit after reading the information in each section.

The pages are beautifully presented, with a large, clear photograph (much better than illustrations for children to really see what the animals look like), but also a surprising amount of information without overwhelming the page – an introduction to the animal, a table of facts and figures, and a *Did you Know?* box (I learnt some new information myself – see the quotes in green!)

Although the books are essentially spotters' guides – with a circle to tick on each page and a certificate at the back for spotting 50 different animals and plants – they do not need to be used only for this purpose. At the community garden (and woodland) where I teach, I carry them in my bag during school visits and refer to them when children ask about, or spot, particular plants or animals, helping to further their knowledge – and that of the adults! I've also bought additional copies for young family members. Highly recommended!

*"The male [wren] builds several nests for the female to choose from, and all but one go unused."*

**Pinnington, A., Buckingham, C. (Author & Illustrator) (2023). *What Can you Spot in the Garde?;* ISBN 978-1-908489-68-5. *What Can you Spot in the Woods?;* ISBN 978-1-908489-69-2. Farnham: Fine Feather Press Ltd. Paperbacks. finefeatherpress.com/books.**

**Reviewed by Juliette Green**

### *Hollow is a Home*
### Abbie Mitchell




*"Take a peek into the world of tree hollows and the animals that call them home."*

Trees are praised for many things, and rightly so: provider of nesting sites for birds; perching place for beautiful flowers; the roots strengthen and structure the soil.

How often do we consider the 'holes' – the oxygenated gaps in a tree – as providing anything? Yet that is exactly the premise of this: a clever (and true) idea, and a clever book.

To you and me, a tree hollow is just a hole, cavity or tunnel in a tree. But to an animal, a 'hollow' becomes a natural bedroom, hiding place away from predators, a nursery, or a shelter from the rain.

Why is this book unique? *Hollow is a Home* is actually the children's book specifically dedicated to the topic of hollow-dependent wildlife. For that, one reviewer stated *"it's my new favourite book from CSIRO Publishing".*

Particularly noteworthy about this book: it is very richly designed and beautifully written, taking it from the reference book shelves and bounced to the world of natural history (ecology).

The chapters are simple yet effective: from 'A hollow is a home' which shows clearly which parts of a tree are used; to 'How safe is my tree?', which looks at threats including habitat loss; to profiles of scientists who study and create action plans to help species that use hollow habitats. Throughout the book, 'creature features' share information about particular species. The reality is that not every species that uses a tree hollow habitat is in a creature feature, however that would very likely have expanded the book well beyond its current 103 pages. An index would have helped to cross-reference the information. The end pages include a list of hollow-using species.

Shortlisted for The Wilderness Society's Environment Award for Children's Literature 2020: Non-Fiction; and the CBCA Eve Pownall Award for Information Books 2020. Longlisted for The Australian Book Design Awards 2020: Children's Non-Fiction Illustrated Book.

A great resource on creatures and their connections with the all-important tree habitat, highly recommended as an information text as well as a superb reader for that future ecologist in your family or class.

**Mitchell, A.; illustrated by Astred Hicks (2019). *Hollow is a Home.* ISBN 978-1-4862-0805-7. Clayton, Victoria: CSIRO Publishing.**

**Reviewed by Henricus Peters**

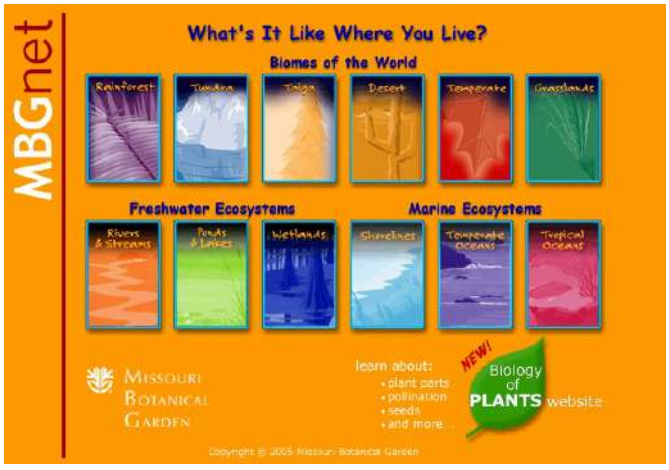
## WEBWATCH

### Websites about biodiversity
### Henricus Peters

We bring you top websites, particularly those with educational materials, related to biodiversity.

#### Life on Earth / Biodiversity in general

**Biomes of the world:** The Missouri Botanical Garden website covers land-based biomes: rainforest, tundra, taiga, grassland, desert, temperate; freshwater: rivers and streams, ponds and lakes, wetlands; and marine: shorelines, temperate oceans, tropical oceans. mbg-net.net




**Our World in Data:** *"Most of our work ... focuses on data and research on human well-being and prosperity. But we are just one of many species on Earth, and our demand for resources – land, water, food, and shelter – shapes the environment for other wildlife too."* ourworldindata.org/biodiversity

**The Convention on Biological Diversity** cbd.int

**Biodiversity for Kids:** the website of the American Museum of Natural History website explains the 'whats' and 'whys' of biodiversity– all in clear language. amnh.org/explore/ology/biodiversity




**Biodiversity Teaching Toolkit**
worldwildlife.org/teaching-resources/toolkits/biodiversity-toolkit

**Biodiversity Activity kit via STEM**
tinyurl.com/yujysj3k

**Children's Biodiversity Activities from Arocha**
tinyurl.com/mryre4yf

**Global Biodiversity Information Facility (GBIF)** hosted portals offer simple, customizable websites that support biodiversity data use and engagement, nationally, institutionally, regionally and thematically.
gbif.org

**IUCN** website covers assessing ecosystems; biodiversity and health; ecosystem restoration; freshwater species; invasive species; managing ecosystems; marine species iucn.org

**National Geographic Education on biodiversity**
education.nationalgeographic.org/resource/biodiversity

## Plants

**Botanical Society of America** aims to *"inspire and promote an inclusive global community committed to advancing fundamental knowledge and innovation in the botanical sciences for the benefit of people and the environment."* botany.org

**Herbarium of the UK and Ireland** is one of the most comprehensive collections of plants from a particular area anywhere in the world. tinyurl.com/yc35cme5




**Plantlife** is the international conservation membership charity working to secure a world rich in wild plants and fungi. plantlife.org.uk

**Plant Watch Canada:** part of Canada's Nature Watch citizen science programs. naturewatch.ca/plantwatch

**Plants and Pollinators:** three lessons from the Smithsonian's Learning Lab. tinyurl.com/57zm46ra

**The five most famous botanists in history** includes such names as Carl Linnaeus, often cited as the founder of taxonomy. tinyurl.com/zve7wuu9

## Animals

**Animal Diversity Web** by the University of Michigan is an online database and encyclopaedia of animal natural history, built through contributions from students, photographers and others. It includes distribution, classification, and conservation biology. animaldiversity.org

Animal Diversity Web
ADW
University of Michigan
MUSEUM OF ZOOLOGY

**Animals of the world – species directory**
tinyurl.com/5y26unce

**Natural History Museum, London:** the Museum's zoology collection consists of over 29 million animal specimens. tinyurl.com/4bxrz6wa

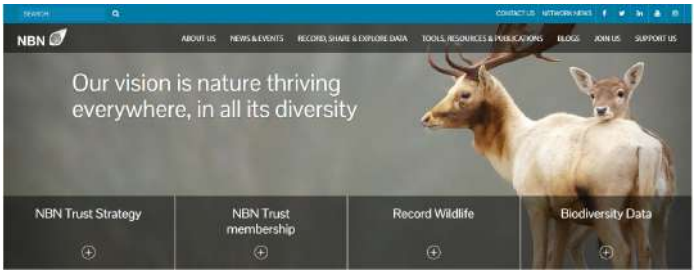
**Zoological Society of London** is an international conservation charity driven by science, working to restore wildlife in the UK and around the world. zsl.org

**University of Cambridge Department of Zoology**
Research referred to in a blog on this website has found that "*80% of the world's most important sites for biodiversity on land currently contain human developments*" tinyurl.com/2p8rssnb

## United Kingdom

**National Biodiversity Network UK (NBN):** a collaborative venture in the United Kingdom, which is committed to making biodiversity information accessible. nbn.org.uk

**NBN Atlas:** *"a free online tool hosting the UK's largest collection of biodiversity information enabling data to be shared."* nbnatlas.org




**Biological Records Centre:** *"a National focus in the UK for terrestrial and freshwater species recording, established in 1964. We work closely with voluntary recording communities."* brc.ac.uk




## Australia

**Atlas of Living Australia:** open access to Australian biodiversity data. ala.org.au

## Bioblitzes / citizen science

**UK – iNaturalist**
inaturalist.org/pages/bioblitz+guide

**USA – National Geographic BioBlitz**
nationalgeographic.org/projects/bioblitz




**Australia – Great Southern BioBlitz**
greatsouthernbioblitz.org

GREAT SOUTHERN BIOBLITZ

Remember to check naee.org.uk for weekly news updates, blogs and publications.

## FINAL THOUGHT

### Celebrating biodiversity through commemorative stamps

**Henricus Peters**

Forest & Bird Society in New Zealand, which celebrates 100 years of conservation work in Aotearoa, highlights its important role through these very special stamps. Protecting biodiversity is at the heart of what the Society does, so the species depicted are very relevant: from forest-dwelling birds of Kapiti Island, through the green gecko and bat of the Catlins – there are only 2 species of bats in New Zealand – and the alpine creatures of Bullers Plateau.

Aotearoa is known as a 'sea-bird capital' of the world, so the fourth stamp of marine birds is pertinent.




New Zealand is unique in numerous ways – New Zealand and Australia separately broke away from Gondwana millions of years ago, resulting in these two lands in particular having a very special range of fauna and flora, therefore 'biodiversity'. New Zealand has not many native mammal species – only two species of native bats and then marine mammals including seals and the unique Hector's dolphin. Amongst its birds, it has the world's only alpine parrot, the Kea. The 'kiwi', New Zealand's namesake bird, acts more like a mammal foraging for food in the undergrowth. The habitats of New Zealand cover the full spectrum – from subtropical rainforests that roll down to the ocean, to a mountain range that splits the South Island. Its central North Island is dominated by a vast volcanic plateau. Tundra in the south are home to the Takahe, with subantarctic islands further south still. Forest & Bird works with like-minded charities to help educate and protect these wild species and wild places.




For all news on NAEE, blogs, journal back issues, a dedicated members' page and environmental education ideas and activities, visit naee.org.uk or email info@naee.org.uk.

Follow us on social media:

twitter.com/naee_uk facebook.com/NAEEUK

Celebrating 50 Years 1971 2021
NAEE
NATIONAL ASSOCIATION FOR ENVIRONMENTAL EDUCATION (UK)
Registered charity no. 1166502