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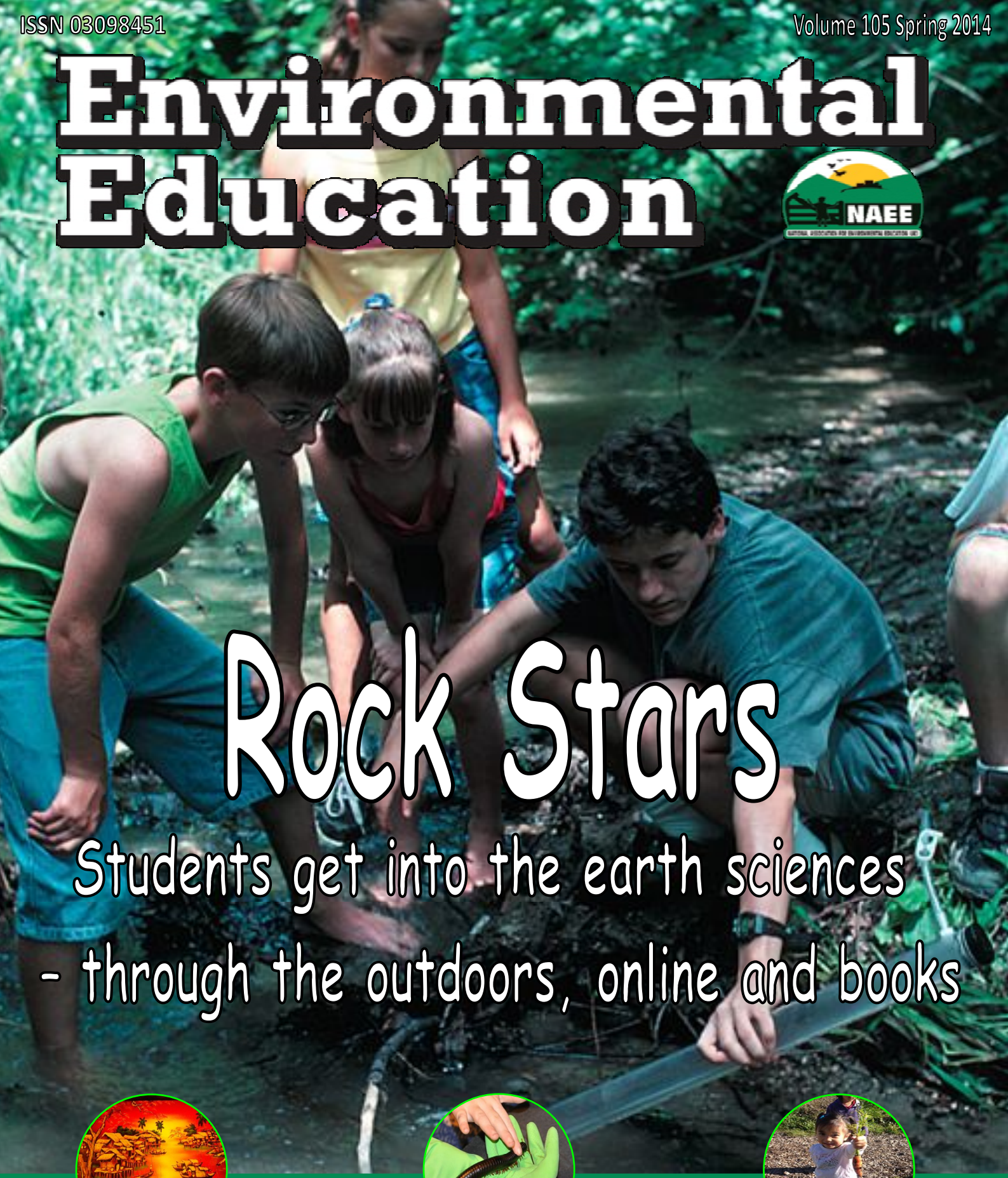
Environmental Education



Rock Stars

Students get into the earth sciences - through the outdoors, online and books

NEW!

* Agenda
* Poetry

Children & Nature projects:

* Kenrick
* Natural Connections
* LIVE

Early Years

One carrot at a time!

National Association for Environmental Education

The key network for all concerned about the natural and built environments ~ promoting education for sustainable development

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Supporting education for sustainable development

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National Association for Environmental Education (UK), University of Wolverhampton, Walsall Campus, Gorway Road, Walsall, WS1 3BD.

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NAEE Coordinator: Heatha Gregory

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On the Cover: *Students learning hands on earth science – details on page 18.*
Main photo by Ann Benbow; other photos by Henricus Peters, Peter Nash and Emily Vera.

Environmental Education is the termly journal of the National Association for Environmental Education (UK) issued free to members.

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Comment

Letters to the Editor

*As the Association turns 45 years in 2014, we asked **'Why did you join NAEE?** and **'What, for you, is special about NAEE'**…. Here are some of your first responses:*

I joined NAEE whilst training to be a teacher at Wolverhampton University, in 2002, 12 years ago. I happened to walk past the office door on campus one day, saw the NAEE sign on the door and knocked...the rest as they say is history! I started my 'career' with NAEE by working as an administrator in the office, and was then invited to join the executive committee once I had graduated. NAEE is special to me due to the dedication, enthusiasm and commitment of the exec, without which the organisation would not be the force that it is. We are also volunteers, many of us still in full-time employment in the education sector, and yet we all give our time and energy up for a cause we truly believe in.

Katie Scanlan

Why did I join NAEE? Back in the 1980s, my main study at Birmingham University for my B.Ed. was Environmental Studies, which is when I discovered and joined BAEE, the Birmingham branch of NAEE. At that time, the Birmingham Education Department ran a prestigious annual exhibition of environmental studies carried out in Birmingham schools, with fierce competition between schools to secure exhibition space.

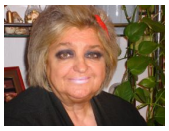
What, for me, is special and unique about NAEE? It is the only organisation run by teachers and ex-teachers to specifically support teachers to deliver Environmental Education through the existing curriculum. This cross-curricular approach helps to raise pupils' awareness of their local environment (both built and natural environment) leading on to informed knowledge and understand of the wider, global environment and the need to follow a more sustainable lifestyle. NAEE encourages teaching and learning about the environment outdoors, through a 'hands-on' approach, i.e. environment *about* the environment (knowledge*), **in*** or *through* the environment (skills), *for* the environment (developing caring attitudes). As a teacher I found this method extremely successful and it helped to form the base of knowledge and experience needed to understand sustainable development.

Sue Fenoughty

Readers are invited to write in with their memories – send to editor@naee.org.uk

Opportunity to Help NAEE
We are looking for volunteer support for our NAEE Office. If you can help or for more details, contact *info@naee.org.uk*

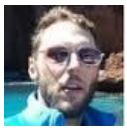
From the Co-Chairs Gabrielle Back and Nina Hatch



NAEE's Kenrick Days Project, which provides Birmingham's city-based children with the opportunity to re-connect with nature by spending the day at a selected outdoor environmental education centre, continues to be successful; also, we are looking at how we might roll out the same kind of experiences further afield. The Kenrick Project – alongside the real pressure on Birmingham City Council's Outdoor Learning Service – has caught the media's attention. We recently featured in The Birmingham Mail, thanks largely to our own Sue Fenoughty. Readers can find the article at *http://naee.org.uk/*.

The Kenrick Project is reported on (page 12), along with the Natural Connections project (page 14) and Alderney Wildlife Trust's 'LIVE' in schools (page 16).

As 2014 is the International Year of Crystallography, we feature earth science studies (page 18), books (page 41) and websites (page 44). We aim to 'cover all ages and stages' – from Emily Vera's investigations in the Early Years (page 27) through Geoffrey Guy's perhaps controversial views on Bushcraft (page 36). Overseas, we hear from Kuala Lumpur and their great work to employing a school sustainability officer (page 31) and from William Scott, our NAEE President, reporting on his recent visit to Beijing (page 38).



From the Editor Henricus Peters

Regular readers will notice some additions – a new ***Letters to the Editor*** section (page 4) with the current focus being on NAEE and its 45th anniversary in 2014! If you have a comment, agree or disagree with us, or wish to challenge us – please do send these in!

We are launching ***AGENDA*** (page 8) which will look at the 'doorways' of a sustainable school and show some examples through photos and notes. Send your examples – we are waiting to hear from you!

Finally, we have a new poetry feature (page 40) as part of our extended ***Review*** pages.
As a membership journal, *Environmental Education* is as much 'your' magazine as is it that of the Executives who produce it. We look forward to hearing from you, so we can make it ever better!

Get in touch at *editor@naee.org.uk* or follow us at *https://twitter.com/NAEE_UK*

NAEE and me

Nina Hatch *New Co-Chair of NAEE and Teacher/Centre Manager at Mount Pleasant School Farm*

I think that I started to become aware of the effects of environmental changes to 'my space' i.e. surrounding my home and immediate family, at about the age of 7. Growing up in the 1950s on the south eastern fringe of London and Kent, we were part of the post war development of suburban living. Across the road and over the stile were the fields where you could still stand and watch the threshing machine.

A little further down the path was the woodland and exploration. One night our dog disappeared into there chasing a fox and didn't return until the next morning. Our road and houses were all brand new, although hardly anyone's Dad owned a car. Then it started to change.

Some of the fields stayed, but were now occupied by horses instead of farm crops, and the M2 motorway carved through some of the wood. More houses appeared and my Dad built a garage on the side of our house. We still went down to the allotment to collect his fruit and veg but we couldn't play out on the road because cars became a regular feature. There wasn't a lot of money for holidays, but my parents always managed to travel to Cornwall every summer where my mother had been evacuated. We stayed on a smallholding so that I could collect the eggs and feed the chickens.

I loved 'finding out' at primary school particularly when lessons were taken out of the classroom. We did investigations in the playground and sometimes even crossed over to the adjoining heathland for playtime, stories and 'nature' lessons. We had music lessons outside - played our recorders and sang. In retrospect it was an ideal way to develop a child's potential in a happy and stimulating way.

Perhaps that's why I decided to become a teacher? I also started to appreciate the social impact of environmental factors on my life. I can still vividly recall having to walk 3 miles home across the heath from secondary school because of the 'smog'.

Years later I became an active member of NAEE after joining the Nottinghamshire branch. This was the 1980s, in the heyday for the development of environmental education in the school curriculum. Nottinghamshire County Council asked me to turn a Victorian village school building into a new environmental study centre. I had 2 classrooms to equip situated on the edge of Sherwood Forest, surrounded by estate farmland, opposite a historic church and graveyard – even a lake through the woods.

Children from the urban conurbations came out for environmental, historical and creative day visits. However teachers' prescriptive workloads, target setting etc were increasing and teacher commitments outside of school time started to decline. By then I was county NAEE secretary and had the unenviable task of winding up the county branch. Some local activities continued but curriculum change was in the wind.

In 1988 I became Head of Centre at an educational farm on the outskirts of Birmingham and the Birmingham branch of NAEE was an ideal way to meet like-minded individuals in a new part of the Midlands. My predecessor had been very active in BAEE and I continued with his contacts. I soon realised that Birmingham was at the forefront of environmental education for the city child as well as NAEE

A battle that is sadly now very relevant. I first met Sue Fenoughty when she brought her class of Juniors for a day at the farm – and so began a professional friendship with and through NAEE that continues to this day. When NAEE was looking for new Executive Committee members Sue asked me to join. I agreed – though reluctantly as I have commitments to a number of other organisations including the local farming community. However I feel that I must give back something for the years of support, social and professional development that I have received.

So now in 2014 I am fighting for the continuance of the national association as well as the local provision of outdoor and environmental education for Birmingham's city based children. I have no golden wand for the future but we must continue to help children to become aware of the environmental and social issues that confront them. We must support and educate teachers who can inspire them, as I had as a child. The Kenrick Days project is a shining example of this. By whatever means NAEE must continue to meet this need, embracing modern technology and styles of expertise as required. We need members, money and most of all vision!

Write for Environmental Education

We welcome articles, reviews and other items from members, supporters and readers.

We are especially interested in case studies of environmental studies, including outdoor education, outdoor classrooms, forest schools – in primary or secondary schools, colleges.

Contact editor@naee.org.uk for details or with your concept!

AGENDA

Edited and photos by Henricus Peters |Some of the 8 'doorways of sustainability' through real life examples.

BUILDINGS AND GROUNDS

Children are now very often born and raised in a city, so 'environmental education' can be a key to providing a context – a real sense of 'place' and 'space'. At school, home or badge-based youth groups such as Scouting, children can be encouraged to ask important questions such as:

* What are the differences between 'urban' and 'rural'? What are the 'pros' and 'cons'?

* What styles of architecture can I see?

* When I compare different cities and their use of space, what do I learn?

* What types of transport systems are there in my city? Are they 'integrated' (do they connect)?

* How many of my wider family, in other partsof the world, live in cities? What is their life like?

AGENDA

ENERGY & WATER

Water is the source of all life and activities – as in 'The Water Issue', Summer 2013 illustrated. Here, water is celebrated in Thai art.

TRAVEL & TRAFFIC

Children learning the rules of the road – the scene will be very familiar for all parents. But, we ask, is it really safe enough for our children to be 'out and about' on the streets – especially as societybecomes more and more car-oriented? Is this yet another consequence of result of 'what Richard Louv, founder of Children & Nature Network, calls 'nature deficit disorder'?

AGENDA

FOOD & DRINK

Students at Yew Chung International Schoolfind out and 'experience' where food comes from.

From Farm to Folk
So where does an egg come from? Where do we get milk from?
These are just some of the 'big questions' students at YCIS have been asking, and using investigations to answer, recently.

The wider concepts and key questions and issues about our food – *where* it comes from, *how* it is actually grown andprocessed, and whether it is grown *locally* or brought in from another country – have been the centre of discussions and investigation in Year 2 classrooms.

Particular questions raised included:
What foods do we eat? What foods 'should' we eat as part of a healthy, balanced diet? What types of farms produce these foods – crop farm, dairy farms, chicken farms, more specialized, e.g. vineyards?

To put these classroom-based discussions with information and slides, into a real life context, the Year 2 classes undertook day trips to Shanghai BIOfarm to give students the practical opportunity to see, touch, smell and – yes even taste … organic vegetables!

Children have learned about organic gardening – no pesticides – which means more 'sustainable' or 'eco-friendly' farms. .

These topic-based discussions also had links with other different curriculum areas including maths – measuring plants and farm objects, weighing vegetables; reporting and describing the processes they have seen in English; creating various farm dioramas in art. The combined in-class discussions, alongside the farm visits, have 'embedded' the concepts through the overarching 'Environmental Education' – learning 'about', 'in' and 'for' the environment. We can happily report that, for students at YCIS the combined influence of classroom activities, hands-on fieldtrip experiences alongside Ecology Action after school activities, and working with the National Association for Environmental Education, Environmental Education is alive and well in our school.

So, when asked 'Where does your egg come from' students will not reply 'the shop', but provide a more thoughtful and considered response!

AGENDA

LOCAL DIMENSION

Students plant seeds – to learn how living things grow and at the same time, becoming more aware of their local environment

AGENDA *aims to feature some of the eight doorways: Buildings & Grounds; Energy & Water; Travel and Traffic; Local Well-being; Food & Drink; Global Dimension; Purchasing & Waste; Inclusion & Participation. Please send in your news items, comments, photos and other examples, to* editor@naee.org.uk

Kenrick Days Report

Juliette Green *NAEE Executive*

Birmingham schools are continuing to enjoy day visits to outdoor environmental education centres, paid for by Hugh Kenrick Days bursaries. Below we report from an Autumn term visit.

Hawkesley Church Primary Academy, Kings Norton – Year 5 visit to Birmingham Botanical Gardens, November 2013

In year 5 we have been looking at the rainforests of the world. Looking at where they are, what makes them a rainforest, what they do for the world and how they are being affected by humans. We have focussed on the geographical and environmental aspects, particularly the issue of deforestation. The children have also learnt about the diverse nature of the rainforest and the incredible range of products, materials, foods and resources that come directly from the rainforest.

Visiting the Botanical Gardens allowed the children to get a sense of what the rainforest is actually like. They explored the glasshouses – feeling the humidity and the heat. They commented on the effect this had upon them, for example how they would have to adapt their clothing choices and what they would take with them if they were to stay for a prolonged period of time. They learnt about the plants, seeing the sheer size and volume of them. They were particularly amazed by the size of a small banana plant, commenting on not wanting to see how big they actually grow!

Whilst at the Botanical Gardens, the children carried out a fact-finding mission, where they looked for plants which are used for everyday products, such as food and drink, medicine and raw materials (e.g. cotton, bamboo and rubber). They learnt that the rainforest provides a huge range of materials; they were amazed, as was I, that there is a kola plant, which was originally used to flavour cola drinks, what a ginger plant looks like and many more.

Juliette, one of the teachers at the Botanical Gardens, explained how the leaves have adapted to the conditions of low light and competition. For example: why some have splits in them, why they are the shapes that they are and how the ‘drip tips’ work. This was particularly well demonstrated with a very simple experiment using a water spray. The children found it fascinating, as did the adults.

Just before lunch, we were privileged enough to see and handle some rainforest animals. This sparked a discussion about the layers of the rainforests they would be found in and where they feature in the food chains. Then after lunch, we explored the outdoor grounds of the Botanical Gardens, hunted for native invertebrates in the woodland, and made bird feeders from recycled bottles.


Since returning, we have discussed the features of the rainforest, looking at specific examples of plants and animals and what we can do to help to protect and ensure their continued profligacy within the environment. We have looked at the Rainforest Alliance and what this charity does to ensure safe practise to the rainforests of the world. We also looked at the mantra of reuse, recycle and reclaim; thinking about how we can implement this into our everyday lives and have even hung some of the bird feeders in our grounds.

In summary, we had a fantastic day and learnt more than we could imagine. We are from a deprived area of Birmingham, and would not have been able to afford the visit without the grant.

Peter Nash, Year 5 teacher, Hawkesley Primary School

Potential closure of Birmingham Outdoor Learning Service centres

The Birmingham City Council Outdoor Learning Service (OLS), which organises visits to most of the centres used for Hugh Kenrick Days (Hams Hall, Bell Heath, Birmingham Nature Centre, Birmingham Botanical Gardens and Mount Pleasant School Farm) is currently under review and may be partially or fully decommissioned.

As part of the review process, a public consultation has recently been carried out (ending on 19th January), to which many teachers, residents and organisations such as NAEE contributed. We await the outcome of this review and hope that Birmingham school children, particularly those who live in deprived areas or places with little or no green space nearby, will still be able to enjoy visits to these centres in the future.

Thanks to the vision and benevolence of Anne Kenrick, a Vice-President of NAEE, and her late husband Hugh, who had a great passion for birds and wildlife, Birmingham schools can apply for a bursary to pay for them to visit an outdoor environmental education centre.

Hugh Kenrick Days are administered by NAEE. To apply for a bursary, or for more information, please contact info@naee.org.uk.

Natural Connections Demonstration Project

Martin Gilchrist *and* **Rowena Passy** *Research Fellows, Plymouth Institute of Education, Plymouth University*

Background

Natural Connections is a three year (2013-15) demonstration project in south-west England. It aims to work with 200 schools to increase the number of children and young people experiencing the benefits that come from learning outside the classroom in the natural environment (LINE).

Plymouth University was chosen to deliver the project, which is funded by the Department for the Environment, Food and Rural Affairs, Natural England and English Heritage. Project development was informed by a synthesis of current evidence around LINEand research with teachers that highlights the wide-ranging benefits that come with learning outside the classroom. These include pupils' increased subject knowledge and understanding, higher performance in assessments and greater motivation for learning. Learning outside also helps to reconnect children with nature, which in turn encourages them to care for the environment, and enhances their health and wellbeing. This evidence is available at:
http://publications.naturalengland.org.uk/publication/1321181
http://publications.naturalengland.org.uk/publication/1989824?category=10006

Project Delivery

The project aims to

- stimulate the demand from schools in areas of high deprivation that are currently inactive in LINE
- support schools in building LINE into their planning and practice
- stimulate the supply of LINE services for schools

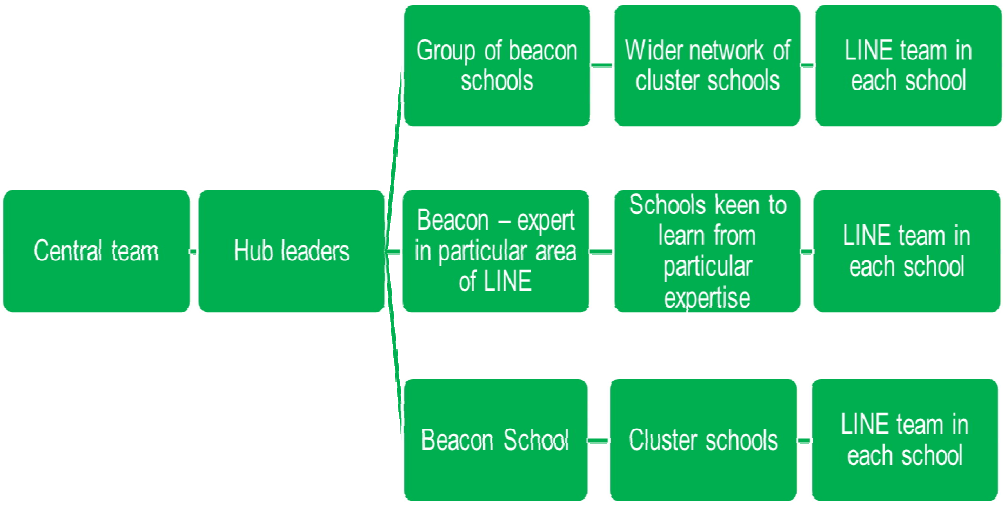
This will be done through a delivery model with four core elements:

- independent local brokerage
- volunteer development programme
- participatory web service
- evaluation of the scale, scope and impact of the project

The five areas – or hubs – in which the project is operating are Plymouth, Torbay, Cornwall, Bristol and North Somerset, and the target is for each hub to recruit 40 schools. A central team manages and facilitates the project, and a hub leader has been appointed in each of the project areas to act as the local broker. Hub leaders have a significant level of freedom in the way they choose to deliver the project and, as a result, can make the most of their existing networks and specific expertise as well as being able to work alongside and within established local structures. Our five hub leaders include a local authority, an educational consultant, a social enterprise, an educational establishment and a conservation charity – an excellent variety of

organisations that contribute different areas of knowledge and expertise to the project, benefitting all as we learn from each other. Hub leaders are responsible for recruiting and selecting beacon schools to the project, and these are selected for their existing expertise around LINE and their willingness and capacity to share this. Beacon schools then recruit and work with a small number of cluster schools to help them develop and embed LINE into their practice. Each school, whether beacon or cluster, has a nominated LINE co-ordinator who works with colleagues to develop LINE in their school.

This is a demonstration project, and we are all keen to understand and learn from the ways in which different approaches work. Our first important finding was that each hub is developing its own model of brokerage in response to local need, the capacity of beacon schools, existing networks, size of hub and organisational structures. The diagram below shows how the models of project implementation are developing: beacon schools can work as a group to support all the cluster schools as appropriate, or beacons can offer a particular expertise to all cluster schools, or (the original model proposed at the start of the project) each beacon school can work with its own group of five or six schools. Given that the hub contexts range from a highly urban, multi-cultural city to a rural county with large distances between schools, this is unsurprising – but it is also a pleasing indication of how hub leaders have taken ownership of the project and are working to ensure that LINE becomes embedded in schools over the long-term. As one hub leader said to us at the start of the project, '*… there is no point firing our schools up for a* [short-term] *project. We are firing them up for life. That's the notion'.*



The attraction of the project for schools is the benefits that learning outside can have for pupils and staff, as well as the mutual assistance that schools in the hubs can give each other in developing their LINE practice. Although some beacon schools have already integrated learning outside fully into their curriculum and everyday practice, we have found that involvement in the project has galvanised their planning and raised awareness of LINE across schools.

More information: *www.growingschools.org.uk* or contact *naturalconnections@plymouth.ac.uk*

Bringing nature LIVE into the classroom

Aurelie Bohan *People & Wildlife Officer, Alderney Wildlife Trust*

LIVE is a website based project for primary schools across Britain looking at some of our amazing wildlife, with a set of live streaming cameras bringing action from the heart of a seabird colony right into the classroom. LIVE works on a 12 week programme focusing on seabirds, mainly the charismatic Puffin and Gannet, and looks at providing an exciting way to engage and focus pupilsontheir work.

"Everyone, staff and children, were really captivated by the idea of watching puffins live on screen in 'real time'. That enthusiasm carried through into the learning and activities which followed."

Pupils take an active approach to Geography learning about Puffin migration.

The programme is split into six two-week topics and covers science, maths, literacy, art and design, and geography, with hundreds of pre-prepared resources designed to link directly to the National Curriculum.

A real emphasis has been placed on using real data and linking to young scientists, giving a real-life context to pupils' work.

The programme is highly interactive with emphasis on communication and working together with the Alderney Wildlife Trust Ecology Team and other schools taking part in the LIVE project.

There are daily blog posts from our Ecology Team with comment functions for pupils to leave questions, and weekly video conferences with the Alderney Wildlife Trust and other schools in the project.

Two-week topics:

- **Habitats**
- **Adaptation**
- **Life cycles**
- **Food chains**
- **Caring for young**
- **Conservation & protection**

There are also four dedicated activity days for pupils to take part in. These work by setting tasks to all schools in a morning video conference, giving pupils the chance to carry out the activities before showcasing their work to the Ecology Team and other schools, and writing their own blog posts.

"The children thoroughly enjoyed taking part in the project and their learning experience was enriched by the live webcams, blogs and data that could be found on the website."

In 2013 we piloted the project to 29 schools with great success, 79% of the schools logged onto the website twice or more a week over the term of the programme, and 69% logged on more than five times a week to use all the resources provided.

Making a 3D model gets pupils to think about the special adaptions a Puffin has for life at sea.

The main benefit we saw over the course of the project was the enthusiasm of pupils about nature, both what they saw on the live cameras and within their own local area, with reports of many of the pupils spending more time outdoors and looking at birds. We also saw a great increase in the confidence of pupils, their willingness to ask questions in front of other schoolsin the video conferencing as well as some being able to answer questions from pupils in other schools. We had some great news back from teachers of pupils arranging school assemblies to talk about Britain's seabirds and all that they had learnt.

"The wealth of resources available on the website enabled us to use it across the curriculum."

There was a great response from the teachers who took part in the project too, they were really engaged and enthusiastic about a different way to teach and bring nature into the classroom. It has been great to see the wide range of prepared resources and investigation tasks for teachers being used, and the amazing resulting work by the pupils. We have had teachers using the LIVE programme during teaching observations and several head teachers who have been very impressed and are encouraging their teachers to signup.

More information *http://burhou.livingislands.co.uk/taking-part* or contact *peopleandwildlife@alderneywildlife.org*.

Teaching about Earth's connected systems

Ann E. Benbow PhD *Director of Education and Outreach, American Geosciences Institute*

Our planet works as a set of interconnected systems involving water, rock, air and life. These systems are the hydrosphere, geosphere, atmosphere and biosphere, respectively. The energy that drives these systems comes from the Sun and from the Earth's inner heat. When something happens in one system, it can affect the workings of other systems. For example, displacement of rock layers on the ocean floor due to an earthquake (geosphere) can produce a tsunami (hydrosphere) that can destroy life (biosphere) if the tsunami reaches land. In drought conditions, much-needed rain (atmosphere and hydrosphere) can re-hydrate the land (geosphere) and re-start plant growth (biosphere).

It is important for children to understand the connectedness of Earth's systems, because human actions frequently have both positive and negative effects on the Earth system. For example, conservation practices can ensure that there are supplies of natural resources for future generations. On the other hand, careless waste disposal can result in soil, air and water pollution. Children need to learn how their lifestyle decisions can affect the health of the Earth system overall.

It can be difficult for upper primary and intermediate students to understand how Earth's systems operate. The very concept of "systems" might be new to them. One way to get them thinking in systems language is to ask them to name examples of everyday systems (transportation, school, computer, cell phone, digestive, solar, banking, healthcare, etc.)

Make a list of their suggestions on a board or flip chart. When you have a number of suggestions, ask the students to look these over and see what they all have in common. In other words, what makes these systems? You are looking for such responses as: they all have parts; their parts are connected; they need energy to operate; they all have a purpose; what happens in one part of the system can affect the other parts, etc. Guide the students to the understanding that a system is composed of parts that work together (processes) to accomplish a purpose. A system needs energy to operate.

Now, divide your students into groups of three or four, working at tables. Give each group an everyday object that operates as a system. These can include: umbrella, stapler, nail clipper, electric pencil sharpener, pair of safety scissors, electric torch, ballpoint pen, egg timer andother similar objects. Each group should also have a large sheet of poster paper and a set of coloured markers. Ask each group to draw a large picture of its object. They should then label the parts of their "systems" and draw arrows to show how energy flows through each system to make it work. The beginnings of their systems should be labelled 'Input' and the product resulting from the systems should be labeled 'Output'. Students should also identify the purpose of the system on each poster. When all groups are finished, post the drawings up in a gallery format and ask each group of students to explain how their object fits the criteria of a system. Each group should also describe the input, processes and output for its system.

In your next class session, you can emphasize the workings of a system by using your students themselves to model a system. Ask students to stand and join hands to form a circle. Identify one student as the Input and the adjacent student as the Output. Give the Input a whistle in one hand and the Output an electric torch. The Input and Output should not be holding hands with each other. When the Input blows the whistle, he or she should squeeze the next-door student's hand. The hand squeezes should travel around the circle until they reach the Output. At that point, the Output turns on the torch. Ask the students to explain how the system works: what are the parts, the processes, the Input, the Output and the energy flow? Ask how they could break the system and what it would take to repair it.

When you are confident that your students are beginning to feel comfortable with systems language and concepts, let them put their new knowledge to work. In another class session on a good weather day, put students into small groups and ask them to make sure they have pads and pencils. Take them outdoors and ask them to make and record observations about the air, water, land and life around them. Spend about 10 – 15 minutes doing this.

When students have completed their lists of observations, go back indoors. Give each group a sheet of poster paper and markers. Ask them to make a diagram showing how their observations fit into one or more parts of the Earth system. They might find it useful to group their observations into Water, Rock, Air and Life. Older students might prefer using Hydrosphere, Geosphere, Atmosphere and Biosphere. Students can use arrows or other symbols to illustrate connections between these Earth systems. For example, a student might draw an arrow from a pond to a cloud and label that arrow "evaporation". Other students might point out that the soil of the geosphere provides a home for animals and a medium in which plants grow. Take digital photographs of the posters so that students have a record of their thinking about Earth's systems.

Throughout your study of the Earth's environments, return to the concept of the Earth as a set of connected systems. This will help your students to understand the possible effects of their lifestyle decisions and will engender a sense of planetary stewardship.

More information Earth Science Week *www.earthsciweek.org;* Earth system interactions: *www.youtube.com/agieducation*.

Rocks and minerals of the Peak District National Park, England

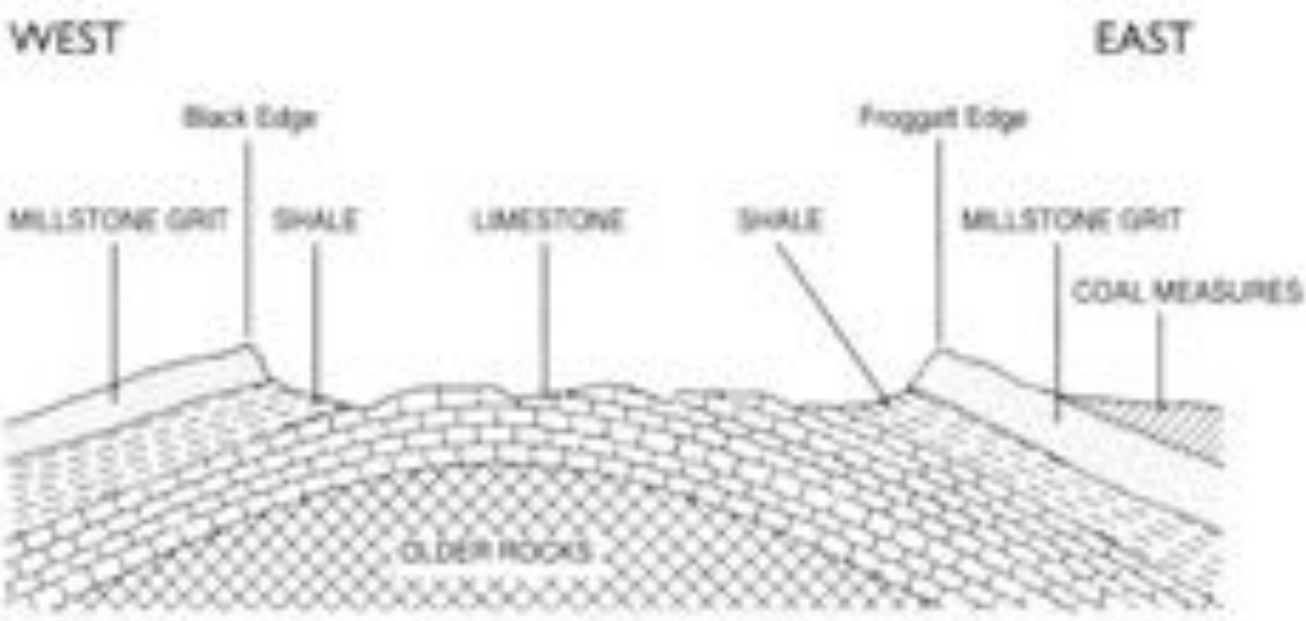
Compiled by **Henricus Peters** *Editor*

The rocks of the Peak District National Park, which were formed over millions of years, are now the basis of the spectacular landscapes we see today. The rocks have a huge influence, not only on the soils and types of plants and animals that live in the area, but also on where people live and the jobs they do.

The underlying geology gives the area many of its special qualities and is one of the reasons why the Peak District was designated as the UK's first National Park in 1951. The rocks and minerals of the Peak District are also an important resource, for example limestone is used in the chemical industry, for agricultural purposes, and in the construction sector for cement and aggregate.

The Peak District National Park has eight distinctive landscape character areas:

Dark Peak; Dark Peak Western Fringe; Dark Peak Yorkshire Fringe; South West Peak; Eastern Moors; Derbyshire Peak Fringe; Derwent Valley; White Peak



Cross section showing profile of different rock types in the Peak District National Park

Where did the rocks come from?

Formed in the early part of the Carboniferous Period (between 360 and 326 million years ago), limestone is the Peak District's oldest exposed rock. At this time the land that is now the Peak District lay just south of the equator and was covered by a shallow tropical sea. The sea was warm and full of nutrients, providing an ideal habitat for many marine species. Corals grew to form reefs encircling clear tropical lagoons in which prehistoric sea plants and creatures lived and died. Many sea creatures, such as sea lilies (crinoids), brachiopods and bivalves, had a hard outer skeleton (exoskeleton) of calcium carbonate. When these creatures died their bodies would sink to the bottom of the sea floor and the soft inner parts would rot away leaving the exoskeletons. Over a period of around 30 million years, the calcium carbonate turned into limestone.

Reefs made from corals were mostly found in a fringe or barrier around the lagoon. A good example of a fossilised barrier reef is the hill behind Castleton on which Peveril Castle stands. There is reef limestone in Middleton Dale and in the Dove Valley where Thorpe Cloud and Parkhouse Hill stand as isolated reefs. Crinoids tended to grow on the edges of the reefs, so reef limestone is usually surrounded by limestone containing many crinoid fossils. Looking like nuts and bolts in the rock, the fossilised stems are known as Derbyshire Screwstone.

Limestone has many uses – as building stone and aggregate (crushed stone) for roads or concrete; to make cement (with shale); and, as burnt lime or pure calcium carbonate, in the chemical industry. Most current quarrying and mineral extraction operations are carried out under old planning consents, which were given before the area became a National Park.

The national park's gritstones and shales were laid down in the middle Carboniferous Period (around 326-316 million years ago) when the northern part of the Peak District was covered by a huge river delta flowing down from what is now the Scottish Highlands and Northern England. The river carried sediments of mud, sand and pebbles which were deposited on the bed and at the front of the delta as it flowed into the shallow sea.

Fine grained mud and sand sediments formed shale and siltstone. Coarser sand and pebbles eventually became gritstone, also known as Millstone Grit because millstones were made from it. As the delta advanced slowly southwards, deposits of mud, sand and pebbles were laid down in successive layers on top of the limestone. The alternating layers of shale and sandstone seen in the face of Mam Tor overlooking Castleton are a result of sands cascading down the front slope of the delta beneath the surface of the sea (turbidites). Later layers of gritstone, such as the Kinderscout Grit which forms the Kinder plateau and the Chatsworth Grit (found around Baslow and the Chatsworth estate) were coarser.

The gritstone outcrops now form a horseshoe shape around the northern fringe of the Peak District National Park, and their sharp edges (scarps) can be seen around Curbar and Calver in the east, Edale in the north, and the Roaches and Ramshaw Rocks in the west. Non-marine fossils are rarely seen in the gritstone rock, but marine fossils can be found in the shale layers of the turbidites, showing that the area was once close to or beneath the sea.

In the swamps behind the delta, plants such as giant ferns and mosses grew to form a tropical forest. Over time, layers of debris from the dead plants built up and were buried. Pressure and chemical changes eventually turned the debris into seams of coal covering the whole of what isnow the Peak District and the land on either side. Around 300 million years ago, movement from deep underground caused the area to bulge upwards, and subsequent erosion wore away the coal measures to reveal the underlying gritstone and limestone. The coal measures on the eastern and western fringes of the Peak District were relatively thin compared with those in the surrounding lowlands. They were largely worked out by the end of the 19th century.

Geology and people

The geological resources of the Peak District have provided its inhabitants with a livelihood from the very earliest times.

Gritstone was quarried in the Iron Age to make hand-powered stones to grind grain ('querns'). Later, gritstone was quarried to make millstones for use in water, wind and steam mills, crushing stones for mineral extraction and as grindstones for the Sheffield edge tool industry. There are more than 1,000 discarded millstones scattered in parts of the Peak District National Park, and the millstone is the Park's symbol.

Gritstone is used as a building material because it can be easily shaped. Chatsworth House is built from gritstone, as are many other buildings in the Peak District. Gritstone was often used to make lintels around doors and windows, gateposts and water troughs.

Limestone is also an important construction material. It was quarried by the Romans, who used it for building stones and mortar. Since the 17th century, the Peak District has been a major producer of lime and limestone, employing thousands of people. Dark limestone, containing fine-grained organic material and other impurities, was the basis of the black marble industry at Ashford and Bakewell from the late 17th until the early 20th century. When polished, the stone turns a deep glossy black.

Bronze Age farmers mined copper, one of the main constituents of bronze, sometime between 2,000 and 1,500 BCE, as well as small quantities of lead for ornaments and ritual objects. The Romans mined lead on a much larger scale, with Roman lead ingots ('pigs') from the Peak District found as far away as Normandy. Several local lead mines were mentioned in the Domesday Book of 1086. Lead was used for water pipes, gutters and on roofs, and later, for lead shot, leaded windows and in paint.

In the 20th century it was the waste material (gangue minerals) from lead mining, notably fluorspar, barite and calcite that became important. Today, the Peak District's spectacular landscapes attract millions of visitors every year. Thousands visit the show caves at Castleton and the limestone crags and gritstone edges draw rock climbers from around the world. Many sites are Regionally Important Geological and Geomorphological Sites (RIGS), and some are also designated as Sites of Special Scientific Interest (SSSIs) for their geological value.

OPAL project to roll out across the UK

Kate Martin and Poppy Lakeman
OPAL web editors, Centre for Environmental Policy, London

Last year was designated the European Year of the Citizen, so it was apt that those twelve months saw a wave of new citizen science ventures get underway.Among them was the European Citizen Science Association (ECSA), which represents practitioners, stakeholders and users, and was officially launched during EU Green Week. The European Biodiversity Network (EUBON) initiative began working on its goals, which include exploring approaches to citizen science and making biodiversity data open and accessible.

Closer to home, the British Ecological Society held the first meeting of its Citizen Science Special Interest Group in November, aiming to encourage networking, collaboration and sharing of expertise. Autumn 2013 also brought the announcement that the long-running Open Air Laboratories (OPAL) project would receive a £3 million Big Lottery Fund grant to enable it to roll out across the UK.

OPAL, led by Imperial College London, has successfully operated in England since 2007, launching seven national citizen science surveys on topics ranging from soils to climate, and collecting more than 50,000 environmental records from the public. The seventh survey, which launched in May last year, focused on the topical issue of tree health and was the first survey that was able to move beyond England's borders with the support of UK governments.

The new grant will ensure that OPAL's public engagement expertise and a wide range of its resources can now also benefit communities across Scotland, Wales and Northern Ireland. The three-year project involves a partnership of key institutions across Britain which will provide on-the-ground support to those who want to explore their local environment. OPAL's other nature surveys will also be launched in the three additional countries.

One of OPAL's key objectives – both in the first phase of the project and for the future – is to inspire schoolchildren, particularly from inner cities and areas of deprivation, to explore and understand their local environment. Education is a core element of OPAL activities and the national surveys are designed to teach participants more about the local environment they are surveying, not just to passively record or sort data.

More information For surveys, ID guides and activities targeted at schools, suitable for inside the classroom and outdoors: *www.opalexplorenature.org/resources*. Teachers could set up Indicia and iRecord: *www.opalexplorenature.org/Indicia*. Contact: *opal@imperial.ac.uk*

Involving teenagers in environmental citizenship

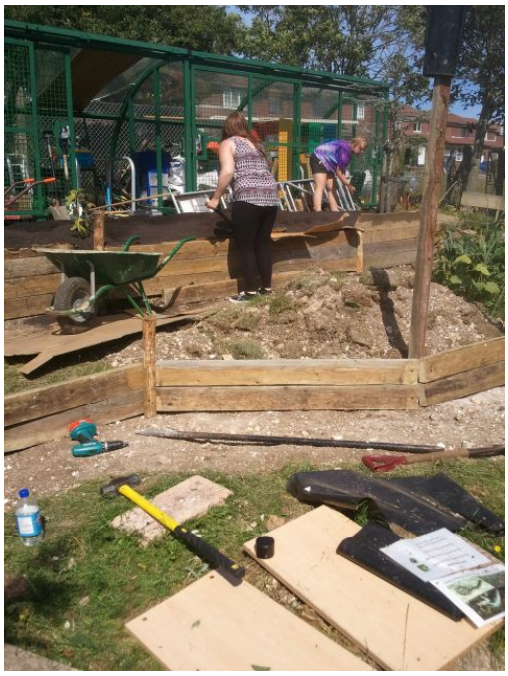
Sjoerd Tel *M.Sc. Youth worker and outdoor environmental educator*

A group of 16 and 17 year old young people helped create a forest garden, as part of their National Citizen Service (NCS) programme [1]. Sjoerd Tel reflects on his experiences as their NCS team leader with Concordia [2].

In my opinion, engaging teenagers with sustainability issues and the natural environment is one of the key challenges at the moment. Several scholars and theorists advocate for interdisciplinary approaches and 'real world learning', collaborating with community stakeholders beyond the classroom walls [3]. NCS is a multi-week youth programme, starting with team building and skills acquisition. I will focus on the second half, which focuses on planning and delivering a project with a community partner.

Although NCS does not specifically advocate an environmental focus, I believe it is a concept well-designed for addressing environmental citizenship.

The project: an overview



My group chose the Brighton Permaculture Trust (BPT) [4] as host for their project, and helped create a forest garden in the grounds of a primary school in Brighton. The group's two-week involvement with the BPT gave the young people an understanding of permaculture, and of how people can benefit from a forest garden in terms of fun, health and learning. They also tasted berries and currants they had never heard of before, explored the habitat of slow worms, and discovered new edible plants and flowers. In creating the forest garden, they got to use power tools, learned how to turn grassland into garden soil and recycled other people's scrap materials (e.g. logs, cardboard).

In a wider scope, they had committed to this project and dismissed two other opportunities based on a self-led discussion and elimination session. How they

wanted to contribute to the project resulted in organisational, creative, physical and communication objectives.

In the end, they could not realise all these objectives, discovering most of their time was needed for the physical elements (digging, hauling wheelbarrows with soil, sawing planks etc.). Nevertheless, they enjoyed being involved and showed satisfaction when seeing the results of their hard work.

Commitment: Making an informed decision

For a group of 16 and 17 year old young people to invest two or three weeks of their free time for a community project is a big thing. Discussing the opportunities and choosing who to get involved with is therefore a crucial stage. If they do not see the sense of their involvement, the group can easily become disempowered and lose motivation for the remainder of the project.

When discussing whether to get involved with the BPT, they mirrored their own norms and values with those of the organisation. Some questions they considered were: “Will we contribute to something worthwhile? How does it benefit the primary school?” They were also aware of their own development, with questions such as: “Does the project match with our skills and interests? What will *we* get out of it? Is the location easy accessible?” Creating space for such critical questions enables the young people to make an informed decision, and lays the foundation for commitment.

The challenge: Big ideas versus realism

Trying to have the young people lead in the development of the project was a key element in my approach. It shows adults have confidence in their capabilities, and they are given opportunities to experiment with leadership, task division, and coping with unforeseen circumstances.

Initially, this worked well, because their goals showed creative thinking and a ‘can-do attitude’. But in the end they had to downscale their plans because of a lack of time and resources. Here lies, I think, a challenge of involving young people in community projects: how to support the initiative and big ideas of the group, while making sure these are in line with the available time and resources and with the aims of the host. Planning in collaboration with the host can be of help as it has several important benefits:

- Expectations are exchanged and plans and ideas can be adjusted before moving on.
- The young people are treated as an equal partner in the project.
- It reduces the risk of the organisation taking control of the project in a later stage when intervention is deemed necessary to keep on track, undermining the youth-led character of a project.

Environmental citizenship

In the end, getting involved with the BPT helped the young people consider how a 'green idea' (permaculture) can be put into practice in a community (e.g. local orchard, volunteering opportunities, outreach gardening work). Approaching NCS from such an environmental angle reflects the concept of 'civic ecology education', which "considers urban areas as linked social-ecological systems, includes opportunities for young people to learn from the practical and diverse knowledge of urban stewards (e.g. community gardeners), and focuses on restoration of urban social-ecological systems" [5]. In this way, young people can engage in environmental citizenship.

Green Citizen Service?

Besides the NCS, there is the ICS. This stands for International Citizen Service. Just like NCS, it is a programme funded by the UK government. With these two programmes up and running, I would suggest GCS, a Green Citizen Service. It could adopt many of the principles of NCS, with an increasing focus on the society-environment relationship throughout the programme.

After all, the environment and sustainability are great for addressing citizenship issues. Whether focusing on food, human rights, land access, politics, charities or recreation, the human-environment relationship can be the starting point for further explorations. As Dobson states, "'the environment' is an exemplary vehicle for the deployment of all the so-called 'key skills' in the citizenship curriculum" [6].

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Building connections: one carrot at a time

Emily Vera *Early Childhood Special Needs Educator, Canada*

The roots–the history

I have always had a love affair with food. Fond memories of being in the kitchen with my mother resonate strongly for me – tasting sauces, licking the whisk, smelling the aroma of a roasting chicken, and later sitting at the dinner table with scrumptious food and lively conversations.

Although my passion for food continued into adulthood, something was missing. It would be many years until I discovered what it was. I was experiencing a disconnect with where my food came from. I slowly began to seek out knowledge about my food: who grew it, where did it come from, how was it processed? How did the origins of my food affect others and myself?

As an Early Childhood Educator, I wanted to share my passion for food and its etiology with my students and their families. I had previously run a pre-school gardening programme but it offered limited learning outside of our gardening time. I decided to embark on a new gardening journey – one that would incorporate the entire food cycle, extending learning in more meaningful ways.

I was committed to teaching the children what I believed to be fundamentally important areas of study: gardening, environmental stewardship, ecological literacy, and food security. I approached Ian Lai, Founder and Director of the Richmond Schoolyard Society, a not-for-profit organisation that supports these core values. Lai has seen amazing progress among the 1500 students who partake in the programme's annual gardening projects.

"The children grow food and taste what they grow," says Lai. "They think it's the best because they have a vested interest. They got their hands dirty."

I wholly agreed, as I know children learn best when they learn in a multitude of ways – weaving the cognitive, kinesthetic and sensorial elements of growing food was a natural trio. With some sound advice and a new patch of land, Lai sent me on my way down an exciting path that included not only a garden plot but learning that extended far beyond the reaches of our 20' by 15' growing space. This plot and its bounty has resulted in deep and valuable learning for my students, their families, and myself as an educator.

The task ahead was colossal. At first, the land was nothing but a strip of weedy overgrowth! Parents, children and teachers united with trowels, pitchforks and hoes, and worked tirelessly to create new garden boxes.

We approached the food cycle from beginning to end. This holistic approach inspired a care and respect for food that has changed the way we all think and feel. I believe this sense of reverence has also infused other areas of learning.

I myself had much to learn. Gardening books lined my night table, gardening and composting courses filled my weekends and conversations with gardening gurus were a frequent occurrence. As I learned, I shared information about plants, life cycles and gardening tips with my students; they in turn shared their knowledge with their families. Suddenly, we had an incredible network of like-minded people, who understood not only the importance of growing your own food but also of fully respecting one's environment.

The plant–the programme

The four-year-old students at Merry King Preschool in Richmond, B.C., attend the early learning programme for 12 hours per week. We visit the farm weekly during fall and spring and every two weeks throughout the winter. Our days at the farm are inherently educational. Children dig in the soil, find worms, plant seeds, harvest vegetables, look closely at wildlife, and become acutely aware of the beauty and magic of nature.

As children wash and eat raw vegetables as we harvest, they expand their palate and vocabulary. Suddenly, children are begging for kale, munching on arugula and fennel seeds and learning names of new vegetables like kohlrabi! I am fascinated by the fact that even the vegetables that are not "market pretty" are still loved and respected. Our pumpkin, beautiful in shape and size, never turned a deep orange; in fact it was quite green. However, there was no judgement passed on this green pumpkin. It was our perfect Jack-o'-Lantern because we grew it.

When asked about the garden, kids respond with enthusiasm. "I love the garden. I like picking all the vegetables and going there," says one of our gardeners, Emma, age four.

Addie, another preschooler, echoed her thoughts. "I like bringing back the carrots to school," she said, "and looking for worms."

"I like to pick kale and make kale chips," said Miele. "I like to listen to the birds singing."

Addie and Connor concentrate on their cutting skills as they prepare kale to put in a salad with quinoa.

We discuss the importance of seed-saving and respecting each plant for its worth. We grow wheat and learn the processes of threshing and winnowing, before grinding it and making it into bread. This activity creates an opportunity for learning about food security, as the ground wheat actually produces very little flour.

We discuss how easy it is to buy large bags of flour from the supermarket, but how much labour it takes for it to arrive on the shelf.

These concepts are multi-layered, but I believe each child takes away something from these types of conversations. As Lai says, “the earlier we start teaching them, the better.”

The challenges

Of course, there are minor challenges in the garden beds – children randomly place seeds to and fro, pull up newly planted crops, and argue about whose turn it is with a certain tool. Throughout these sessions I am discovering the importance of letting go of gardening ‘perfection’. I relish these moments as they are learning opportunities for all of us. The biggest challenge of running this programme is the amount of work required outside of class time. There must be a willingness of staff and parents to commit time outside of class to look after the garden – weeding, watering, planting crops and pest control are some areas that need ongoing attention.

The flower–the benefits

To meet my goal of taking the learning outside the garden itself, last school year we used our vegetables and seeds in class to explore concepts around numeracy, literacy and science.

“The garden to table programme gives the children an opportunity to explore, wonder and investigate the entire process from planting all the way to cooking and eating,” says Michelle, Teacher Librarian at the Richmond School District. “It allows the children to try many different fruits and vegetables. I am always amazed when we go to the market and my daughter tells me all about the different things she has learned. She is so proud of herself.”

The children’s pride strengthened as we cooked with our produce, ate wholesome snacks together and composted our waste. Our efforts were shared with families in a farm to table dinner. We cooked a delicious meal that included chili made with our own beans and root vegetables, garlic confit and bread. In preparation, children made invitations, placemats and even created a play for entertainment. Children hosted this dinner with great enthusiasm. It was a memorable evening, allowing parents to see their children as capable learners.

“As a parent of two children who participated in Merry King's gardening programme, I have witnessed first-hand the learning that occurs as students engage in the process of planting, nurturing, harvesting and consumption,” says Lisa, Teacher Consultant at the Richmond School District. “Their learning about food and its creation is authentic and connected to their own lives.”

The students built a connection to the land and its natural inhabitants which has now become part of their world; one they care about and will defend to keep healthy. By sharing nature with our children, the future of our children, our communities and our land is bright.

Example session: Exploring scarlet runner beans

Jack proudly displays a giant Red Ace beet.

Gardening: Plant beans, allow children uninterrupted time to dig in soil. Investigate the ecosystem around, discuss the water cycle, sun, growth patterns. Harvest beans when ready.

Group Time: Show children scarlet runner beans. Let them feel them and take time to investigate their shape, colour and size. Talk about the life cycle of the bean.

Art: Lay out beans and pods and invite children to do a still life of a bean using different mediums such as charcoal, pastels, paint, collage materials.

Numeracy: Measure growth of the plant, predict how many in a pod, count beans, group beans in 2s, 5s, 10s.

Literacy: Introduce new words such as germination, sprouting, soil, root system, photosynthesis.

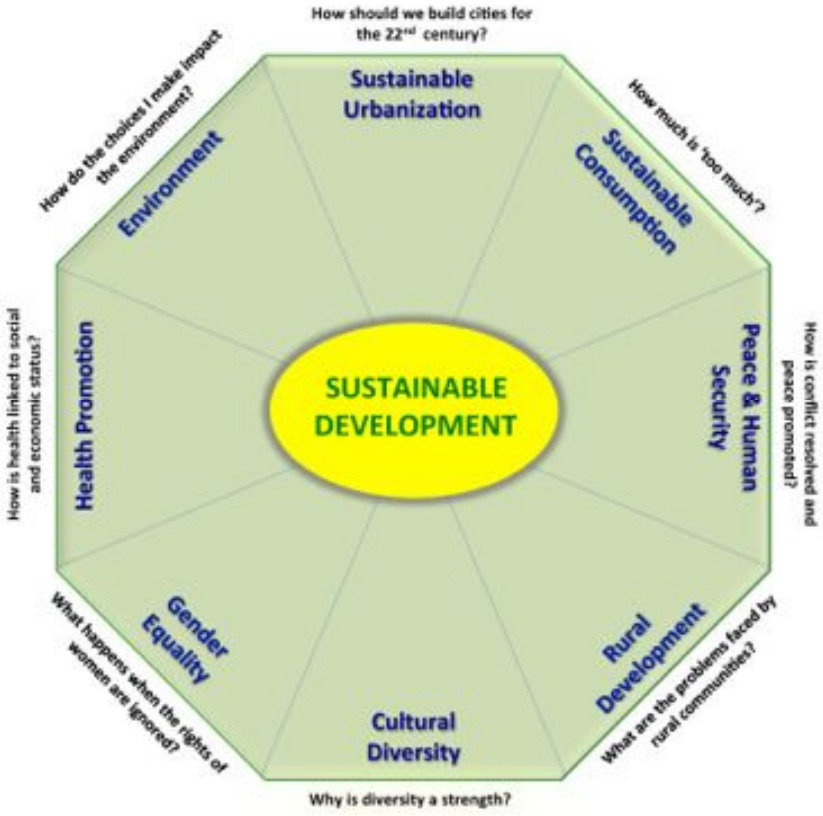
Cooking: Shell, soak and cook beans. Introduce new recipes.

More information *www.westrichmondchildcare.org* | *www.kidsinthegarden.org*

Building a path to sustainability

Laurence Myers *Sustainability & Service Learning Coordinator, International School of Kuala Lumpur*

August 2010 marked the beginning of a new era for the International School of Kuala Lumpur. The faculty position of Environmental Coordinator (now the Sustainability & Service Learning Coordinator) was created, and with it came a fundamental shift in the way ISKL saw itself. A grassroots initiative, the position was a recommendation by the school's Green Team to the Head of School and Board of Directors to allow time to be given to something we all viewed as important. It also marked the beginning of a bold new direction. Through the development of curricular standards and benchmarks, and our newly acquired "Green Flag" status through the Eco-Schools programme, we are moving with confidence in that direction.



Our school's Education for Sustainable Development octagon – the foundation of our ESD standards and benchmarks

Curriculum

The Coordinator's first job was to infuse aspects of ESD (Education for Sustainable Development) into what we are teaching. Our starting point was adopting the eight themes as

recommended by UNESCO to create a set of standards and benchmarks for each division. The themes have been expanded into a series of standards to which teachers can make on-going contributions. To support this, a resource bank has been constructed to help teachers bring in relevant topics as part of their delivery of the subject. The idea is that the ESD curricular efforts are a living model for sustainability and can adapt to changing conditions and levels of preparation, for we all know that communities need time to change.

In addition to the ESD standards and benchmarks, which are currently documented 232 times across our curriculum, we introduced an ESD framework – a project based approach – to teach the interconnections between society, economy and environment. We utilize this framework to varying extents across the curriculum, from pre-school through to high school. To this end we have a variety of examples of how our curriculum utilizes our own school's facilities as well as our environmental indicators to study and provide solutions to school problems and concerns. This is also extended to the home. For example, a yearlong mathematics project in the eighth grade on sustainability asks students to identify a utility in their home, provide possible solutions, and go through a project whereby students undergo a series of changes to their habits to reduce their use. The end of the project asks students to project the time it would take for them to reach utility use to the level that is sustainable.

As a natural bridge we are currently applying service learning methods toward ensuring that our students recognise the connections between sustainable thinking, processing, action planning and serving. Though still in its relative infancy, our programming is expanding and becoming more broad-based with the creation of various committees aimed at bridging ESD and service learning. In addition, we are utilizing collaboration to ensure that unit planning follows an increasingly integrated approach as we move forward.

Measuring Environmental Impact

Another key area is reducing the school's environmental impact. A Green Vision statement has been adopted to show what we are working towards and five accompanying indicators (energy, water, paper, CO_2 emissions and waste) are monitored to see how successful the changes to our practices are.

Currently improvements are being made on a variety of fronts such as the use of ecologically sound cleaning products and the development of an extensive composting programme. ISKL has, similarly, developed and adopted "sustainable procurement guidelines" as a guide to decision making for resources. Our recycling programme has expanded to include sets of bins (non-recyclables, aluminium, paper, plastic and juice/milk cartons), many of which were sponsored by teachers and student groups, which also helped to reduce our waste. We make exclusive use of recycled paper for photocopies and educational needs.

The school will hopefully soon be in a position where the canteens produce no waste for landfill. One big move in this direction is the building of a bio-digester – ***as seen at left***–on our elementary campus, which has proven to be a big educational success (particularly with our students doing the 5th grade alternative energy unit) and has kept food waste from the cafeteria close to zero. We also currently run a composting-from-home programme for families, which is utilized by our canteen vendors.

ISKL measures electricity, water use, paper and copy use, use of EDS standards and benchmarks as well as air travel carbon emissions. These are what we refer to as "environmental indicators" and are used to generate data on how we are doing on the operational side of things. We use the data from these indicators to inform practices and also to provide students with a data set in which to study, particularly in recommending alternatives. One such initiative was utilizing IB group 4 projects, which focused on planning for our new campus (discussed below), to generate study of sustainable practices that we can use as we plan for our new home.

Student Ownership & Initiative

Central to making ISKL a truly environmentally friendly school is the need to empower students to lead environmental initiatives. The high school Earth Club students currently run a successful community recycling programme once a month that coincides with our community composting programme. The middle school Global Issues Club promotes awareness of the Millennium Development Goals. The Elementary School has a Roots & Shoots Club and a Green Earth Club which both focus on environmental issues as well as getting out into nature. This year we also introduced an elementary school Recycling Club – ***pictured right*** –that will provide much of the necessary work for our on-going programmes on our Melawati (elementary school) campus. At the high school the now-three-year-old Green Council, which is student led but represents our entire school community (students, teachers, administration, staff, parents), has become the umbrella organization for ISKL

environmental efforts. One of the main tasks of the Green Council is ensuring that our school is utilizing the Eco-Schools 7-step methodology in most everything we do.

This was critical in our becoming South East Asia's first Eco-Schools Green Flag recipient on August 21, 2013! But even now we expect the leadership of the Green Council to continue and the Eco Schools 7-step methodology to be utilized as we infuse student initiative ever deeper into our school's environmental ethos even as we embark on more ambitious plans to reach out into the community.

This past year's Eco-Schools initiatives, which have focused around the Eco-Schools theme of "Nature and Biodiversity", have included the creation of a Malaysian Garden, the construction of the bio-digester, and a hydroponic garden (with vegetables and herbs to be used by our cafeteria), a tree planting on campus (with local species) and a tree inventory, with the data collected informing decisions for our new campus. These, of course, are only some of the instances of "bringing nature in". The other side of the story, "getting out to nature", is something we've done for years. A week-long adventure expedition in the middle school is the feature of our Malaysia Week programme and has been the shining light of ISKL's outdoor education for years. Only recently has the high school come up with its own version (though a bit more service based) called the Global Action Programme. Where Malaysia Week takes students out to sites all over the country, the GAP programme takes them further afield to places as far away as Tibet and Nepal, as well as more regional or local destinations. To overcome the obvious environmental costs associated with this air travel, we have committed to paying for carbon offsets through Climate Care and also have instituted a colour-school that provides limits for student choice so that they cannot go to more than one location that is considered "long" distance. Giving students more access to the natural environment will be aided by the inception of the International Award Scheme at the high school and tree planting with the Global Environment Centre will help the students recognise the need to give something back to the environment.

The Future

Plans are underway for the building of a new campus that will host all our schools. We are eagerly awaiting the formal agreements and are crossing fingers that it will happen relatively soon. Why? Because our board has committed to a Green Building Index –Malaysia's equivalent to the LEED programme–Platinum rating for the new campus. Filled with natural spaces and with a planned abundance of natural and sustainable teaching stations, we are hoping the new campus will become the critical link for our programmes. A true example of sustainability in action, where the students, like the adults, can recognise the value of sustainable planning,

where the associations are made between what we teach in the classroom, the ethos we hope to instil, and the practical, real-life example they will utilize each and every day.

It's a good time to be at ISKL for sustainability. In truth there is much more to do, and moulding minds and capacity takes considerable effort. When determining what to do first, at ISKL we have chosen that the best way forward is to put sustainability everywhere. But we have a structure to make it happen and a person responsible for it all. The Sustainability & Service Learning Coordinator's job is to find that balance and balance is, after all, what sustainability is all about!

More information http://www.iskl.edu.my/learning/environmental-sustainability-development/index.aspx| http://www.iskl.edu.my/learning/service-learning/index.aspx

- SutainableISKL Blog: http://sustainableiskl.blogspot.com
- SustainableISKL Web: https://sites.google.com/a/iskl.edu.my/sustainable-iskl/
- Green Council Web: https://sites.google.com/a/iskl.edu.my/greencouncil/home

Using Bushcraft to Promote Environmental Education

Geoffrey Guy *Countryside Management Lecturer & Course Manager, Duke of Edinburgh Award*

Within the context of their own lifestyles indigenous peoples have been practising 'environmental education' for thousands of years (Sterling 2001), although these skills survive in remote areas of the globe, in our society they are more often than not deemed to be little more than an adventurous free time activity or a topic of interesting TV documentaries. Despite this, several case studies have made the observation that the effectiveness of environmental education could be increased by the inclusion of 'free time' and adventurous activities within the wider programme (Cooper 1998). I have used bushcraft activities within environmental education programmes both to provide this kind of 'free time' or adventurous element but also to directly link to curricula. Some examples of these activities follow.

Campfire Cooking When I cook on a campfire with younger students or students with special needs I often cook cakes or pizza as this is something they probably won't have done before. The problem with the fact that the cake mix has been made or the pizza dough prepared means there is not a lot to engage the students around the camp fire until the cooking is over. They might cook marshmallows or do other things to occupy them while it's cooking but they're not involved in the cooking of 'their' cake or pizza.Recently I have been experimenting with a way of keeping all my students involved in a camp cooking task. The group in question had been doing some plant ID, looking at Umbellifers and identifying them from stems and seeds; having learned to identify cow parsley and hog weed we collected some hog weed seeds to make biscuits with. Keeping students involved in the preparation of a campfire and mixing of ingredients rarely presents any problems; all of them were fully engaged with lighting the fire, grinding the seeds and mixing the ingredients. Once everything was mixed and ready, instead of using a Dutch oven as I normally would, each student wrapped the blade of a spade with tinfoil and cooked their own biscuit in it. This kept everyone engaged with the whole task and students were able to do the entire cooking task themselves from start to finish. Often students would leave these sessions talking about the marshmallows they had cooked or the bracelets they had made while the main meal was cooking, this time it was the cooking they were talking about. From a group management point of view this made things much easier as I didn't have to try and supervise half a dozen individual activities as well as watch the fire at the same time.

Bushcraft to promote plant ID skills I have used bushcraft activities to promote the development of plant ID skills in students studying organism identification as part of their countryside management courses for some time, and have proved the effectiveness of this in a recent study on the value of bushcraft in formal education (Guy, 2013). Rather than just teaching plant ID by identifying specific features of a plant such as its leaves and bark I also teach what each plant could be used for. For example, lime (*Tiliacordataspp*) could be recognised according to its vaguely heart shaped toothed leaves, the sticky residue from its

flowers, the suckers at its base and any number of other features but as well as showing students this they go on to collect some bark and use it to make a metre of string strong enough to lift a toolbox. This kind of practical involvement with the plants and trees helps students remember.

This kind of activity can be easily differentiated for any audience, for example:

- ***Very young children:*** How about teaching tree identification by relating them to a popular story, for example; "this is a yew tree, Robin Hood would have made his bow out of wood from this tree".Then you can move onto ash and alder as arrows and have them make simple bows and arrows. Or you could focus on a particular part of the plants structure which will make it memorable, everyone remembers 'sticky weed' don't they, the sticky buds of horse chestnut, the burrs of burdock, rosehip itching powder and many others will be similarly memorable.
- ***Special Needs Students:*** Since there are such a wide variety of needs within the label of 'special needs' it is hard to address this topic in just a few words. A couple of activities I have used successfully include making a willow rope for a tug of war, tinder collection and variations on the activities I mentioned for use with very young children. Making a crude willow rope does not require well developed fine motor skills and if it takes the weight of a couple of people pulling on each end it will not fail to impress, they won't forget willow after that. Another advantage of this activity and tinder collection is that they can both be done from a wheelchair. Thistledown, dry grass, cow parsley stems etc. can all be collected easily and will be memorable especially if students can set fire to them.
- ***Advanced Students:*** This is where you can bring in wild food, fungi, medicinal plants, fine cordage manufacture and other more advanced skills.
- ***Very Advanced Students:*** Consider using 'shocking' tactics if students are a bit older and more experienced they will have heard and know things, like yew is deadly poisonous, watch the look on their face when you pop a yew berry in your mouth (make sure you spit out the stone!!). Fungi foraging is another good one for very advanced groups.
- ***Corporate Groups:*** It is likely that these groups will want some kind of team building element to the activities they are involved in so how about a scavenger hunt to identify and collect appropriate resources for a multi person friction fire kit?

Important: Remember that for any of these activities you will need to have a good knowledge of plants available in the area you are working and be aware that plants are a seasonal commodity and not all activities will be possible all year round. There is also a DANGER when it comes to teaching young children and students with special needs about wild edibles, they are not always fussy or cautious about what they put in their mouths. NEVER study fungi or poisonous or easily mistaken plants with these learners and always confirm correct ID.

References

Cooper G (1998) O*utdoors with Young People - A Leader's Guide to Outdoor Activities, the Environment and Sustainability*, Russell House pub.

Guy G (2013) *The Value of Bushcraft in Formal Education*. Unpublished.

Sterling S (2001) *Environmental Education; re-visioning education and change,* Green Books for the Schumacher Society.

Contact ***gda.guy@googlemail.com***

Reviews

Conference

A Morning in No. 55 Experimental High School

William Scott *NAEE President*

I went to an ESD Forum in Beijing in the autumn and gave a talk on the problems of establishing indicators that would help us know whether we're becoming more sustainable – or at least less unsustainable, and whether policy and strategy need to be changed. The talk: '*The Development ofESD indicators – exploring frameworks and criteria* is on my blog [*Note 1*].

A highlight of the Forum was a visit to No. 55 High School which is one of Beijing's experimental ESD schools that also has an international arm where the International Baccalaureate is taught, mostly to children of ex-patriots. I always find visits to school absorbing, but this one was compelling. I was impressed by what we saw of the relationship between students and teachers, and by the facilities, and I was told by others that the geography lab looked more like an interactive museum than a normal classroom, so good were the resources. We could choose which classes to see, and I went to see an English and then a physics class, as I thought I'd have a fighting chance of understanding what was going on.

The former was conducted all in English, with strong student participation, including through ICT, although it was firmly based on a workbook that was looking dated even though the issues it focused on were timeless. There was a European geography theme to the class, though whether a real geographer would have said that is a moot point. The physics class was about resolving forces and had demonstrations and student practicals. Again, participation was strong. As there was a significant integration of maths within the class, this gave me the chance to rehearse my sines and cosines. I was shamelessly pleased to work it all out; hope for me yet, I thought. I certainly wished I'd had a physics class like this when I was 14/15. Then again, these are the sort of students who do really well in the OECD's PISA tests that were in the news here in early December.

A Dutch colleague and I, after our different classroom experiences, said to each other: *So, was there any ESD*? He reckoned he had experienced it in a biology class which had cancer as a focus, and where the photochemical smogs so common in China now (but mercifully nowhere to be seen on this visit) were identified as a contributory factor. My English and physics classes had no such opportunities, but I did wonder whether a 2014 rewrite of the English textbook would grasp the possibility.

However, it turns out that, from a Chinese point of view, it was all grist to the ESD mill because of the clear association between a 'quality education' and ESD. The strap line in the No. 55 school assembly hall said this:

> "To produce high quality education in the process of sustainable development education"

This pedagogical emphasis was reinforced in the talk we had from the school principal who said

this:

> "The main goal of the ESD is to teach students the knowledge, learning abilities, values and ways of living that sustainable development requires. Learning abilities include basic and sustainable learning ability. In previous education methods, teachers emphasise on teaching students basic learning abilities rather than sustainable learning abilities, abilities like literacy, basic calculation, problem solving, reading, oral communication, writing, etc. There is no doubt that these abilities are extremely important and necessary for the future studies of students, especially in high school. However, only possessing basic learning abilities is not enough for the sustainable development of students.
>
> ESD allows us to realise that, throughout the process of teaching basic learning abilities to students, there is also the need to enhance the students' sustainable learning abilities, as it is a necessary factor in the students' future studies and development. Sustainable learning abilities include: the ability to actively collect data and further process it, to independently reflect on and analyse problems, to cooperate with others when solving and exploring problems, to individually face issues about sustainable development and propose solutions to these issues and so on.
>
> Over the past few years, our school has been putting the principle of ESD in China into practice: *primary research, comprehensive infusion, activity co-operation and the unification of knowledge and action*, using this as a basis to create new and effective ways of teaching. The school's highest objective is to create quality education within education of sustainable development. …"

The notion that "*possessing basic learning abilities is not enough*" but thatthere is also the need to enhance students' sustainable learning abilities, as a necessary factor in their future studies and development, is something that UNESCO would approve of. That said, however, there is a necessity to ensure that the foci on knowing how to learn, and actually learning, are continually monitored to ensure that an appropriate balance is maintained.

Clearly, encouraging such innovation is important, and it was interesting to listen to a Forum keynote talk about ESD in Hong Kong, to look for similarities and differences with what's happening across China more broadly – if only in experimental schools such as No. 55. In Hong Kong, there was more of an emphasis on curriculum innovation, and what is taught, and not just on pedagogical practice and quality learning, as in the mainland. There was also a notable emphasis on liberal studies, including personal development, science, technology and the environment, and on society and culture. In a way, it was much more familiar, as befits, perhaps, Hong Kong's recent dual cultural and educational heritage from China and the UK, and the past emphases on good teaching and learning.

There is considerable merit in this mixing. Indeed, Hong Kong also has a strong emphasis on cross-boundary and cross-sector learning, and on inter-cultural dialogue. UNESCO, of course, has long said that ESD will emerge as a response to cultural, contingent and contextual necessity, and a better example of this in this 'one country, two systems' approach could not be found.

It was a wonderfully stimulating morning. It ended with lunch for which a small group of fast-food refuseniks joined the teachers, and I was pleased to see that all the waste food was destined for the nearest pig farm.

Note 1. My talk is at: http://blogs.bath.ac.uk/edswahs/2013/10/29/my-beijing-keynote – alternatively, just search for "my Beijing keynote".

Nature Through Poems

Sarah Simmons *Assistant Editor*

The Marsh

by Cheryl Sandberg

The clouds are placed in such a way
that seems to cast some heightened logic
on the foray of the flats and clay,
picking out the green from beige.

The moist brown ink and tainted gold,
is straw becoming copper, weaving
slanting yellows, burnished and bold,
turning their flower heads skyward.

A wood plank cabin, drifting on this sea,
warden of thistles, sailing grassy waves,
brings forth from within a twisted old tree,
pushing up from the shadows beneath.

Over to the east a strip of melting blue
calls the pillions to a duel, pulling cables
drawing lines, thrice bisecting the view,
resisting the urge to whip free.

The grasses beckon, giddy, for beyond
the factory's spires are morbidly cold,
their flavour is on the wind and its bonded
the smell of nature and industry.

'The Marsh' by Cheryl Sandberg

Children's poem, 'The Marsh', explores the impact that industry and pollution have on our natural environment. Throughout the poem there is a longing for nature, best conveyed by the grasses beckoning to a world beyond the 'morbidly cold' factory spires. Furthermore, many natural objects have been described using phrases more commonly associated with industry, such as the 'straw becoming copper…burnished and bold'.

This poem, with its stark imagery, also provides an ideal opportunity for you to link into several key curricula including both the Geography (Local Environment) and English (Creative Writing) topics. Through these links, your pupils can begin to develop an understanding of the impact of industry on our natural environment.

'Into the Woodland' by Robert Patinson

Children's poet, Robert Patinson, takes his audience through a spring-time woodland; sharing the natural colours and sounds experienced. Through the use of adjectives and personification the woodland comes alive and subsequently the reader feels the calm and wonder of nature at its finest.

This poem would make a fantastic accompaniment for teachers exploring the topic of woodlands with their classes.

To access both poems and respective teacher activities visit the English Poems for Kids website: http://www.englishpoemsforkids.com/

Into the Woodland

by Robert Patinson

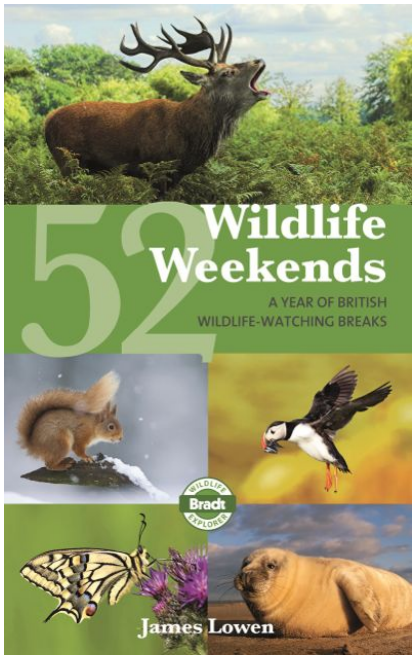
I wonder further in the wood
then pause to take in all I could,
and there beneath its canopy
I'm caught up in all its beauty.

The colours start in palest green
a vibrant living leafy screen,
and spreading out in waves of pink
the Willow Herb and nettles link.

Insects buzz in whispered words,
the broad old Oak is full of birds
where great tits dare an early call,
beneath Jays dig within the sprawl.

Beyond a line of foxglove towers
rise above a glade of flowers
and light, a shaft between the trees
guides me on with quiet ease.

52 Wildlife Weekends ~ *A Year of British Wildlife Watching Breaks*
By James Lowen; Bradt Travel Guides UK, 2013. ISBN 9-781841-624648.
Henricus Peters *Editor*



Author James Lowen has, according to the intro, immersed himself in all aspects of natural history since he was able to walk. He, with the essential assistance of a multitude of wildlife-loving friends in wildlife charities across the country, brings us a rich banquet of 'what to watch' and 'the best season and places'. Full marks for covering all species – yes fungi get a mention – and going to most corners of the British Isles.

The layout is based on the calendar: January's summer – seals, through April – badgers, birds of prey and plant life; into July with butterflies, sharks and water voles; October finds swans, muntjac and red deer. The author provides 5 'wildlife targets' so you have plenty to choose from, but the reality is of course – much depends on where you live, how far you can go and who is with you – family or a class of school children? – will determine much.

It must be said that some species will be much easier to find – muntjac in London compared to the Scottish wildcat – but the guide does its best to provide a 'Practicalities' page for each weekend. Such listings are bound to get of date, but at least they give the reader a start.

A few specific niggles for this reviewer: It's dangerous to 'make up' headings rather than say something clearly – 'Don't Spurn the Chance' (seeing wetland birds….??) and 'Leap of Faith' (salmon…) are two examples. The author being overly-lyrical such as 'The Chiltern evening is balmy, windless and expectant' – can be off-putting and I am not sure what it contributes to the 'good/great guide'. I used to live in the Chilterns – and the description could be of many places, so unhelpful.

A map shows the geographical location of each chosen 'weekend', however the colour coding refers to a month, and not a season, which is confusing for this reviewer. Some way of integrating both would have been better. It has a useful index, which is crucial for any guide. Also, a good summary of the best wildlife weekends, are on page 222.

A very good overview guide – and certainly more practical than some of the tomes (weight-wise) I have encountered. Recommended for every school library and Science or Geography Coordinator's bookshelf!

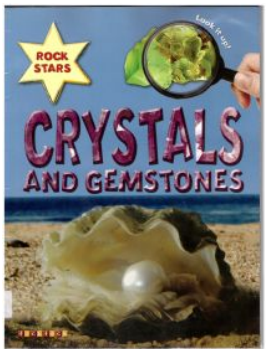
***Special Offer:* Members and readers who quote 'NAEE40' can get 40% discount. Contact marketing@bradtguides.com**

Children's books about… rocks and minerals

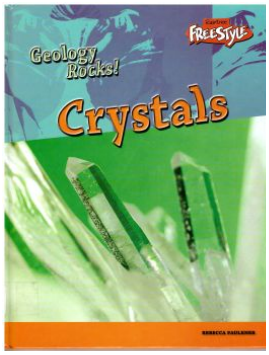
Juliette Green *NAEE Executive*

To celebrate the 2014 International Year of Crystallography, this edition focuses on children's books about rocks and minerals.

Rocks and Minerals: Eyewitness Explorers
Steve Parker; Dorling Kindersley, 1993
61 pages; ISBN 0 7513 6012 0
This book invites the reader to *"investigate the fascinating world of rocks and minerals"* and includes a wealth of facts (definitions of rocks and minerals, types of rocks, metals, gemstones, uses of rocks, the relationship between rocks and soils etc.), projects (e.g. how to make your own rock collection) and stories (including the dangerous work done by children down coalmines in the past). Each page has a clear, engaging layout and includes eye-catching and informative photographs, diagrams and illustrations.



Rock Stars: Crystals and Gemstones
Chris and Helen Pellant; Ticktock Entertainment/Media Ltd., 2008
24 pages; ISBN 978 1 84696 696 5
"Travel deep into the Earth and discover the amazing crystals hidden beneath our feet!"
A colourful, easy-to-read book about what crystals are, how they are formed and how they are made into gemstones. The information is quite basic (for example they include the hardness scale for gemstones but neglect to mention the fact that it is called the Mohs scale), but is a simple introduction to some of the concepts of geology. Pages 16 to 21 provide a useful guide to some crystals and gemstones, with a photograph of each example and information about its colour, hardness and where it is formed. There is also a handy glossary at the back and a 'Did you know?' section with interesting facts.
There are three other books in the 'Rock Stars' series: 'Rocks', 'Fossils' and 'Minerals'.



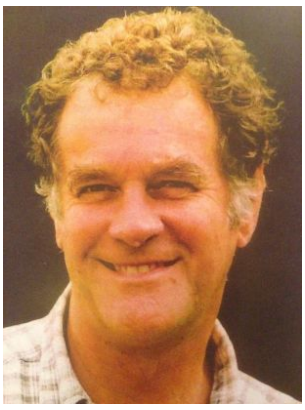
Geology Rocks! Crystals: Raintree Freestyle
Rebecca Faulkner; Raintree Publishers, 2007
48 pages; ISBN 978 1 406 20652 4
A more detailed book in the same vein as the one above. More suitable for upper Key Stage 2 and lower Key Stage 3 pupils. Includes diagrams to show how different types of rock are made and the layout of atoms in different crystals (with analogies such as likening the arrangement of atoms in a crystal to tomatoes packed together), amazing photographs of various crystal forms found around the world and definitions of key words/phrases at the bottom of some of the pages. It also includes a comprehensive glossary.

Reviews

Material Matters: Metals: Raintree Freestyle
Carol Baldwin; Raintree Publishers, 2004
48 pages; ISBN 1 844 43189 4
Part of the same set of books as the one above (Raintree's *Freestyle Curriculum Strand* – see www.raintreepublishers.co.uk for more details), this book is packed with photographs, definitions, facts and figures about the huge group of materials known as metals, and promises that *"this science book is not just for boffins!".* Aspects covered include: atoms and elements, groups of metals in the periodic table, extraction, alloys, metals and their reactions, and the uses of various metals. Great to see that it also mentions environmental issues such as recycling and the pollution that can be caused by mining activities. At the back, there is a 'Find out more' section which suggests other books, websites and Internet search tips.

Sci-Hi: The Reactions of Metals
Roberta Baxter; Raintree Publishers, 2010
48 pages; ISBN 978 1 406 21080 4
A clearly and colourfully laid-out book, aimed at Key Stage 3 students, which contains information about how metals react with other materials. Plenty of chemical equations, photographs, fact files and information about the way various reactions impact on everyday life (e.g. oxidation reactions creating rust, metals in the body, the many uses of alloys) and environmental issues such as recycling and pollution. I particularly loved the quiz at the end to help consolidate learning!

Obituary



Peter Smith HMI was a loyal supporter of environmental and outdoor education, lively, enthusiastic, inquisitive and full of fun. He was a keen climber, and as a student he made it up to the roof of Merton College to hang an Essotiger's tail from the bell tower! His contributions to the Council for Environmental Education (CEE – now SEEd) and National Association Environmental Education (NAEE) events were just as challenging and humorous.

Peter's background was in geography and town planning. He taught at Leeds Grammar School, and then Newcastle Polytechnic and Leicester Polytechnic. He joined Her Majesty's Inspectorate (HMI) in 1980, when HMI could actively support teachers with professional development courses, publications and curriculum advice, as well as inspect schools.

Peter Smith was a liberal educator, open-minded and respectful, and at CEE we valued his advice on matters of policy and practice. But most of all we just loved him for who he was.

Libby Grundy and Nick Jones

WEBWATCH

Henricus Peters *Editor*

In this edition, we look at child-focused news sites, crystals, and earth sciences generally.

Websites for kids

http://www.timelines4kids.com/ This websites helps kids to understand the world through the use of detailed timelines. Whilst it has a heavy US focus, many sections are extremely useful – 'Maps of the World' shows how our perceptions have changed; World Religions and World Population Growth have very important up to date data. Look out for http://www.timeforkids.com/minisite/environment

http://www.timeforkids.com/ The US-based news magazine aimed at making stories and features palatable for children and young people. Has many good science features. Also has 'Homework Helper' and opportunities for Kid Reporters, plus Common Core resource help for teachers.

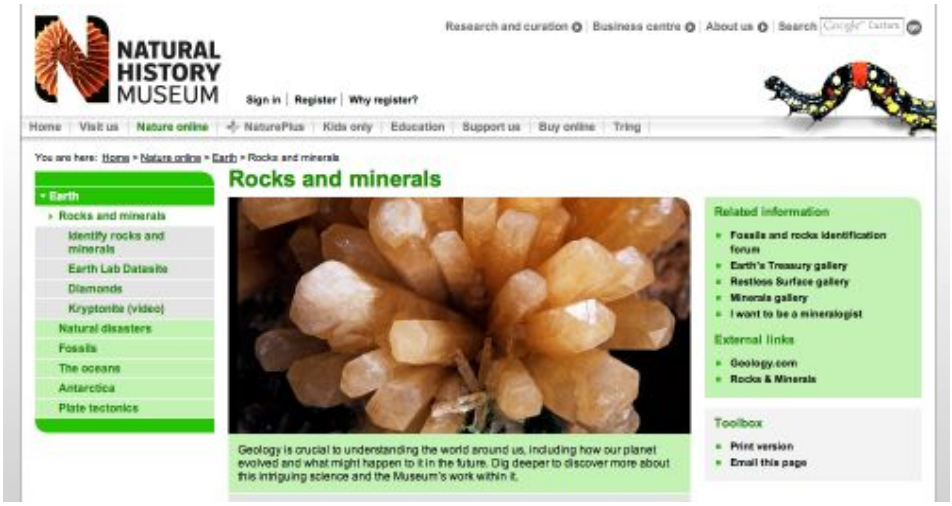
For those following the UN Year of Crystallography, here are some good websites for reading and research about crystals, rocks and earth sciences:

http://www.sciencekidsathome.com/science_topics/what_are_crystals.html
The science behind crystals explained. KS2 upwards.

http://www.esta-uk.net/ The website for the Earth Science Teachers' Association – a good organization for teacher resources including a magazine and courses.

http://www.rockwatch.org.uk/ The nationwide club for young geologists, with the site having many resources about rocks and local branches and museums where kids can join in with hands-on activities.

http://www.geography.org.uk/ An excellent organisation and their website with a huge raft of resources for both teachers and upper KS students – a site this reviewer visits often. Includes the natural and human impacts of earthquakes in New Zealand, as one example.



http://www.nhm.ac.uk/nature-online/earth/rock-minerals/ One of the largest collections of natural resources anywhere – and a website which supports this with visual and downloadable resources, school activities, 'Live' events. The earth sciences galleries are very graphic! Membership is available and recommended for the young or older nature-lover.

http://www.naee.org.uk/ Our NAEE website is growing and expanding – check out the 'Resources' with downloads; 'Organisations' for groups we are connecting with; also look out for the new Member Update section.

Social Media: Remember that websites and groups with good sites will send updates direct to you by email – you will need to 'subscribe'; or else you 'follow' them in twitter, 'like' them on facebook etc. NAEE do this!

Please send your favourite and most-visited websites to Henricus Peters at editor@naee.org.uk

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Contact the NAEE Office by email: info@naee.org.uk or tel: 01922 631200
Or visit our Website: ***www.naee.org.uk/get-involved***

How do I write for *Environmental Education?*

We welcome articles, reviews and other items from members, supporters and readers. We are especially interested in case studies of environmental studies, including outdoor education, in primary or secondary schools. These may occasionally be reprinted either on their own or with other articles in NAEE publications.

Please ensure you have permission to use any photographs, and send them as separate jpeg files.

Please contact editor@naee.org.uk with your idea or submission.

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National Association for Environmental Education UK
Supporting education for sustainable development

NAEE is an educational charity, managed by teachers, for teachers ofenvironmental education everywhere! This journal is free to all NAEE members.