

primary science & technology bulletin

Ideas and inspiration for teachers in primary schools

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Let's Talk bogs



Figure 1 - Common Sundew (Image from IUCN UK Peatland Programme by Norrie Russell [5]).

What is peat?

Peat is made up of partially decomposed plants, including a high percentage content of *Sphagnum* mosses.

How do peat bogs form?

Water-logged conditions lead to a reduced amount of oxygen available. This inhibits the growth of bacteria that decompose plant material, so only partial decomposition occurs. Peat bogs form very slowly when the water-logged conditions are maintained for a very long period of time, leading to the formation of a layer of peat. It can take a year for a 1 mm thick layer of peat to form. Peat depth varies from 50 cm to 3 m on average, but depths of up to 8 m are not uncommon [1].

Where can peat bogs be found?

Peat bogs occur in many places around the world. Today over 20% of Scotland's land area is covered by bogs, comprising about 15% of the global total for this habitat [2].

Why do peat bogs need to be protected?

Peat bogs are very important habitats and some plant species are only found in the particular conditions that occur in this habitat. One of the plant species that captures the imagination is the round-leaved sundew (*Drosera rotundifolia* - Figure 1), a carnivorous plant that can be commonly found in Scottish peatland habitats. For further information on this amazing

plant, check the Scottish Wildlife Trust website [3].

Peatlands are vital stores of carbon. Globally, peatlands store at least 550 thousand million tonnes of carbon - this is more than twice the carbon store in all forests [4].

Peatlands are also essential stores of water. By holding water and slowing its release into rivers, peatlands help to minimise flooding. *Sphagnum* mosses are abundant in a peatland and can hold up to 20 times their own weight in water.

How are peatlands managed?

Many peatlands have small artificial dams installed in key locations to retain water on the site, ensuring that the habitat remains water-logged so that peat can form. Naturally re-seeded trees are also removed as trees take up large volumes of water from soil and would dry out the habitat.

Let's Talk bogs discussion activity

The 'Let's Talk' series of discussion activities are resources that promote discussion skills on a wide variety of topics. Let's Talk bogs aims to provide teachers with a resource

which will help them to raise some of the environmental science issues relating to the preservation of peat bogs with their pupils. It is written for pupils at CfE second level but it could be modified to be used with younger or older pupils. This discussion activity is available to download from the SSERC website [6] and supports the following sections from Science Principles and Practice:

- making informed personal decisions and choices;
- expressing opinions and showing respect for others' views;
- developing informed social, moral and ethical views of scientific economic and environmental issues;
- discussing and debating scientific ideas and issues.

Practical activity to compare absorbency of sphagnum moss with that of other materials

The statistic that *Sphagnum* moss can hold up to 20 times its weight in water is very interesting, but how can we demonstrate what that looks like? It would be irresponsible to remove *Sphagnum* moss from a peat bog, but we can use other materials to investigate whether there are any other common materials that can match this amazing absorbency. >>

Material	Weight (g)	20x weight (g)	Water added (ml)	Water recovered (ml)	Weight of water held (g)	X weight of water	Is it as absorbent as <i>Sphagnum</i> moss?
Paper towel (example figures)	2	40	40	30	10	5	No
Towel							
Sponge							
Nappy							

Table 1 - Example recording sheet for comparing absorbency of materials to absorbency of *Sphagnum* moss [7, 8].



Figure 2 - Equipment used for practical activity.

For our investigation, we compared the absorbency of *Sphagnum* moss with that of kitchen paper, sponge, towel and disposable nappy, recording our results in the format shown in Table 1.

For this activity we used:

- A balance (or kitchen scales, accurate to 1 g) to measure the weight of the material being tested.
- A measuring jug to hold the water supply for the team.
- A 100 ml measuring cylinder to accurately measure the correct volume of water to be added to the material.
- A funnel.
- A plastic container to hold the material when the water was added to it. (Once the material had absorbed as much water as it could, the excess water was then poured back into the measuring cylinder, using the funnel to prevent spillages.)

The full set of equipment is shown in Figure 2.

This activity is a great way to apply maths in a practical science investigation. The children can discuss what everyday materials might be absorbent and decide what to investigate. It is also a good opportunity to illustrate that 1 ml of

Experiences and Outcomes

- I can use my knowledge of the interactions and energy flow between plants and animals in ecosystems, food chains and webs. I have contributed to the design or conservation of a wildlife area - *SCN 2-02a*.
- Through carrying out practical activities and investigations, I can show how plants have benefitted society - *SCN 2-02b*.
- I can report and comment on current scientific news items to develop my knowledge and understanding of topical science - *SCN 2-20b*.
- When I engage with others, I know when and how to listen, when to talk, how much to say, when to ask questions and how to respond with respect - *LIT T 1-02a*.
- When I engage with others, I can respond in ways appropriate to my role, show that I value others' contributions and use these to build on thinking - *LIT 2-02a*.
- When listening and talking with others for different purposes, I can exchange information, experiences, explanations, ideas and opinions, and clarify points by asking questions or by asking others to say more - *LIT 1-09a*.
- When listening and talking with others for different purposes, I can:
 - share information, experiences and opinions;
 - explain processes and ideas;
 - identify issues raised and summarise main points or findings;
 - clarify points by asking questions or by asking others to say more - *LIT 2-09a*.
- I can use addition, subtraction, multiplication and division when solving problems, making best use of the mental strategies and written skills I have developed - *MNU 1-03a*.
- Having determined which calculations are needed, I can solve problems involving whole numbers using a range of methods, sharing my approaches and solutions with others - *MNU 2-03a*.
- I can use the common units of measure, convert between related units of the metric system and carry out calculations when solving problems - *MNU 2-11b*.

References

- [1] <https://www.nature.scot/landscapes-and-habitats/habitat-types/mountains-heaths-and-bogs/blanket-bog> (accessed 21st May 2019).
- [2] http://www.parliament.scot/ResearchBriefingsAndFactsheets/S4/SB_12-28.pdf (accessed 22nd May 2019).
- [3] <https://scottishwildlifetrust.org.uk/species/round-leaved-sundew/> (accessed 21st May 2019).
- [4] http://www.iucn-uk-peatlandprogramme.org/sites/www.iucn-uk-peatlandprogramme.org/files/Peatland_Leaflet_ONLINE_V2.pdf (accessed 21st May 2019).
- [5] <http://www.iucn-uk-peatlandprogramme.org/uk-strategy> (accessed 21st May 2019).
- [6] <https://www.sserc.org.uk/subject-areas/interdisciplinary-learning/lets-talk/let-s-talk-bogs/> (accessed 21st May 2019).
- [7] <https://www.sserc.org.uk/wp-content/uploads/2019/06/Lets-Talk-Bogs-Practical-Recording-Sheet.pdf>.
- [8] <https://www.sserc.org.uk/wp-content/uploads/2019/06/Lets-Talk-Bogs-Practical-Recording-Sheet.docx>.

water is equivalent to 1 g and to gain practical experience using a balance and reading levels in a measuring cylinder.

Thank you to the IUCN UK Peatland Programme for giving us permission to use the Sundew image taken by Norrie Russell [5].

ENTHUSE Celebration Awards

SSERC was delighted to host the Scottish ENTHUSE Celebration Awards 2019 [1] at the Engine Shed in Stirling on 14th May 2019. These awards celebrated excellence in STEM education in Primary & Secondary schools, in school leadership and for technicians and support staff. The event allowed SSERC to commend the commitment of the winners to professional learning and the impact that it has had on them, their pupils and their school.

All winners were invited to attend the National ENTHUSE Celebration event at the Royal Society in London in June 2019.

While the highlight of the event was the awarding of prizes, the day also included updates on the opportunities that SSERC supports and facilitates through a range of wider STEM engagement programmes.

Kevin McKeever, Manager of the STEM Ambassador programme in the east of Scotland provided an update, highlighting the wealth of knowledge and experience that is available to schools and community groups through this volunteer programme. It is noteworthy that in the findings of the Education Scotland STEM CLPL Survey Findings (June 2017) [2] this bank of approximately 6000 active individuals are regarded as key providers of professional learning for teachers.

In 2018/19 SSERC facilitated 22 STEM Insight placements, allowing teachers and technicians time in industry to gain experience about the world of work and potential employment opportunities that they could then share with pupils in their schools on their return. Such opportunities recognise that those in regular contact with young people can influence subject choices, future study options and career pathways. Whilst in a privileged position to inspire and direct, many recognise they do not always have the appropriate knowledge to do this



From left to right in picture: Derek Boath, Monifieth High School (winner Excellence in STEM Teaching Secondary), Martin McKenna, Holy Cross Primary School (winner Excellence in STEM Teaching Primary), Angela Barclay, Monifieth High School (winner School Leadership in STEM), Alastair MacGregor CEO SSERC, Karthika Paranthaman, Boroughmuir High School (winner Excellence in STEM Teaching Technician), Mark McShane and Graham Armstrong, Kinross High School (Joint winners School Leadership in STEM), Heather Reid OBE.

effectively. Such placements provide the opportunity for educators to increase their own STEM capital. Helen Winton, Head of STEM Engagement SSERC provided an overview of these placements while contributions from Karen Alexander, STEM Manager Dumfries House and Sarah Morgan, Jacob's highlighted the benefits of teacher placements to businesses.

Heather Reid, OBE Meteorologist & Education Consultant provided an inspiring Keynote 'The importance of Excellent STEM Education' in which she highlighted how her passion for physics was kindled

by an inspirational teacher. She emphasised how those in the teaching profession can inspire the questioning and inquiry skills in young people, thereby increasing their scientific literacy. She also shared the enjoyment she has had from being involved as a Polar Ambassador over the last 2 years, supporting the Polar Explorer Programme [3]. The build, launch and operation of RRS Sir David Attenborough brings an exciting context to the teaching of STEM subjects. The associated education programme encourages and supports schools that are keen to raise aspirations and attainment >>>

in STEM and aims to inspire the next generation of scientists and engineers. 47 schools across Scotland have benefitted from this opportunity over the last 2 years.

Graeme Rough, Project Manager for the Young STEM Leader Programme provided an update on the development of this exciting opportunity. With a pilot currently underway, the programme will be available to all young people across

Scotland in 2020 through school and community groups. The key aim of the Young STEM Leader (YSL) programme will be to facilitate the development of peer STEM role models to inspire more young people to develop an interest in STEM and pursue the study of STEM subjects and relevant future careers.

SSERC are very grateful to the Engine Shed who gifted the use of their facilities for this event. <<

References

- [1] <https://www.stem.org.uk/enthuse-celebration-awards>.
- [2] <https://blogs.glowscotland.org.uk/glowblogs/STEMcentralinmotion/2018/08/27/stem-professional-learning-survey-2017/>.
- [3] <https://www.stem.org.uk/welcome-polar-explorer-programme>.

SSERC professional learning courses

Our professional development courses range from twilight events, day-courses through to residential meetings lasting up to 6 days in total. Our curriculum coverage spans both primary and secondary sectors and we offer events for teachers as part of their career long professional learning, newly qualified teachers and technicians. Many of our events receive funding from the ENTHUSE Bursary scheme or the Scottish Government.



Courses available for online booking include:

COURSE NAME	RESIDENTIAL?	DATES	CLOSING DATE	SECTOR
STEM CLPL for Early Level	No	30 August 2019	23 August 2019	Primary
SSERC_Meet: Light Shades & Shadows	No	26 September 2019	30 August 2019	Primary
SSERC_Meet: Fun with Forensics	No	2 October 2019	6 September 2019	Primary
Creativity	Yes	28-29 October 2019	27 September 2019	Primary & Secondary
SSERC_Meet Pneumatics & Hydraulics	No	12 Nov 2019	18 October 2019	Primary
Super Science & Terrific Technology	Yes	15-16 November 2019 20-21 March 2020	1 October 2019	Primary
SSERC_Meet: Further Fun with Forensics	No	18 November 2019	18 October 2019	Primary
STEM CLPL for Early Level	No	22 November 2019	8 November 2019	Primary
SSERC Conference	No	6 December 2019	8 November 2019	Primary & Secondary
SSERC_Meet: Teddy in the Park	No	26 February 2020	31 January 2020	Primary
SSERC_Meet: Science Inquiry: Observing, Exploring & Classifying	No	4 March 2020	7 February 2020	Primary

Please check our website pages at <https://www.sserc.org.uk/professional-learning/calendar/> for the most up-to-date details on our career long professional learning calendar.

Digital skills at SSERC

We are delighted to report that, with support from the government, we are able to deliver digital skills training across both primary and secondary sectors. A new Digital Skills Education Officer is in post and with the support of the Digital Team in Education Scotland, we have been able to offer a range of digital skills courses.

The courses are:

- Enriching Opportunities across the BGE - Early and First.
- Supporting Literacy and Language using Digital.
- Computing Science - Building and Testing Computing Solutions using Block Based Coding.
- Laying the foundations of Computing Science - Early and First.
- Computing Science: Enriching Opportunities across the BGE (3rd and 4th Level).
- Discovering Micro:Bits across the BGE.
- Reaching all learners using Digital tools.
- Supporting Learning using Rich Media.



In addition, we have been delivering external professional learning sessions in partnership with, and for, Education Scotland, Universities and Local Authorities.

During 2019/2020 we plan to increase the number and variety of courses and programmes offered in this important area of the curriculum.

Here is a link to our session catalogue for 2019/2020: <https://sway.office.com/pL26C8sZQCGHhNF?ref=Link> <<



"I loved the mix of information transmission, hands on playing and exploring and sharing of ideas and good practice. Being pointed in a direction for books and apps that are of high quality is invaluable when there is so much choice available. It's great to have time to give things a go so you can really imagine how it might work in your setting. I have also come away with nice videos, quotes and ideas to share with my staff to inspire them!"

Enriching Opportunities in Computer Science, Early and First Level

The Young STEM Leader (YSL) Programme: Inspiring and developing young people through STEM

A new Scottish programme which will give children and young people the chance to develop their personal skills through Science, Technology, Engineering and Mathematics (STEM) is being piloted this month (June).

Aiming to spark greater interest and participation in STEM, the YSL programme will give children and young people the opportunity to lead, inspire and mentor their peers through the creation and delivery of STEM activities within schools, Early Years Centres, community groups and youth initiatives.

Young STEM Leaders (YSLs) can do anything from running a coding club at lunch-time with friends to helping a classmate struggling with their coursework to dreaming up and leading a unique STEM activity or event in their community. The programme encompasses a wide definition of STEM, including gaming, music, digital, design and the environment.

For younger pupils, the YSL programme offers a great chance to unleash their creativity and get hands-on either in the classroom or with a community group. For teens, it represents an excellent way to develop personal skills that will help them stand out from the crowd with employers and university/college admissions.

As well as helping the Young STEM Leader (YSL) to develop important 'soft' skills such as leadership, active listening, mentoring, organising and creativity, it is hoped that the programme will motivate YSLs to continue with their STEM studies and embark on a career in STEM.

The Scottish Government's Strategy for STEM Education and Training (2017) [1] has committed to 'establish a new Young STEM Leaders programme to stimulate and strengthen the development of peer mentoring and inspiration in STEM for children and young people by children and young people.'

The YSL programme is being funded by the Scottish Government led by SSERC and a range of partners, including the Scottish Science Centres, Scottish STEM Ambassador Hubs, Science Festivals, YouthLink Scotland, Young Scot, Children in Scotland, Education Scotland and the Scottish Mentoring Network.

Graeme Rough, YSL project manager, said: 'This is a fantastic opportunity for children and young people to discover, create, inspire and lead their peers, in the process developing a range of highly-desirable and transferable personal skills. As well as improving their own STEM skills and knowledge, those working with the YSLs will also be inspired by these positive young role models.'

The YSL programme will be rolled out across Scotland by 2020. More information on the YSL programme is available at www.sserc.scot or from the project team at ysl@sserc.scot. <<

Levels of the YSL Programme

The Young STEM Leader (YSL) programme will be non-formally accredited at Curricular Levels 2, 3 and 4, underpinned by a framework that identifies the skills, knowledge and behaviours expected of a Young STEM Leader at each level.

SCQF Levels 4, 5 and 6 will be formally accredited and certificated, underpinned by outcomes and performance criteria for each level.

Every YSL will receive digital and face-to-face training on the skills, knowledge and behaviours required to complete each level.

Reference

[1] <https://www.gov.scot/publications/science-technology-engineering-mathematics-education-training-strategy-scotland/>.



SSERC in Partnership with The Scottish Childminding Association

At SSERC we pride ourselves on providing excellent STEM (Science, Technology, Engineering and Mathematics) focused Career Long Professional Learning (CLPL) opportunities for educators across Scotland.

From the early years all the way through to college we support teachers, classroom assistants and technicians to keep up-to-date and improve their knowledge and skills. Now we are delighted to be extending our work to provide childminders in Scotland with STEM training and resources in partnership with the Scottish Childminding Association (SCMA).

The 2017 STEM Education and Training Strategy for Scotland [1] recognises the importance of early intervention, stating “The early years are crucial in providing a foundation in STEM skills and in inspiring and igniting children’s enthusiasm.” With the 2020 deadline fast approaching for the early year’s expansion in Scotland, which will see all children over the age of three eligible for 1140 free hours per year of early education and childcare, childminders are being recognised more than ever as an integral part of this provision [2]. Maree Todd the MSP for Childcare and Early Years reiterated this recently when she announced the provision for more training and development for childminders.

Part of this provision comes in the form of STEM learning and development. Head of Childminding Services in Scotland Janine Ryan worked with SSERC to apply for funding under Education Scotland’s Enhancing Professional Learning in STEM grant scheme. With funding approved, work is now well underway between SSERC and SCMA to deliver on phase one of the proposal which includes providing both e-learning modules and face-to-face training for childminders as well as a bank of resources.

It is important to remember that parents don’t choose childminders to provide a formal education but to allow their children to enjoy the care and play opportunities which are unique to a home setting. Play-led learning is gaining an increased recognition as the best way for young children to learn, after all, even Einstein said, “play is the highest form of research”. This means that any training needs to link to the Curriculum for Excellence and suit a play-based environment with supporting resources being readily available in any home or park, so out with the magnets and motors and in with the play dough and pinecones.



Training modules filled with childminder friendly ideas and activities and the science behind them have been produced and will be available online at www.childminding.org for members of SCMA by June 2019. The modules include; an Introduction to STEM, Senses, Science Inquiry and STEM Outdoors. We will also be welcoming childminders from across Scotland to SSERC for face-to-face training on 29 June 2019.

We look forward to continuing to work with the SCMA to support the amazing work that childminders across Scotland do. <<



References

- [1] Gov.scot. (2017). Science, Technology, Engineering and Mathematics: education and training strategy - gov.scot, available at <https://www.gov.scot/publications/science-technology-engineering-mathematics-education-training-strategy-scotland/> (accessed 12th May 2019).
- [2] Consult.gov.scot. (2016), available at https://consult.gov.scot/creating-positive-futures/expansion-of-early-learning-and-childcare/user_uploads/451371_blueprint-2020.pdf-1 (accessed 12th May 2019).

