



STEM By Nature: Project Summary & Status

STEM By Nature: STEM teaching & learning in nature settings, using outdoor learning approaches

STEM skills (science, technology, engineering, maths) can help individuals and society understand and mitigate some of the most urgent global and local issues of sustainability, climate change and managing the planet's natural resources.

Actively engaging people in wild places gives opportunities for learning outdoors in real life contexts. Nature provides rich, multi-sensory experiences that can be a catalyst for curiosity and an important starting point and context for STEM learning. It offers opportunities to incorporate hands-on outdoor activities, Citizen Science, real-world learning relating to the Sustainable Development Goals and climate. It is widely recognised that STEM subjects are highly gendered which narrows opportunities for learners and is reflected in subject uptake and career pathways¹. STEM By Nature seeks to address these inequalities by focusing on STEM Skills that can be developed through outdoor learning experiences and signposting outdoor role models that challenge stereotypes.

Produced by FSC (Field Studies Council) Scotland and the John Muir Trust, 'STEM By Nature' has been designed to help build skills and confidence in using nature and outdoor learning approaches to deliver STEM. It recognises that, whilst links are widespread and established to a certain degree, they are often assumed or under-developed. The concept aims to make connections more prominent and accessible and promote good practice.

Outcomes

STEM By Nature Professional Learning Programme has:

- delivered 249 cumulative hours of CLPL to 70 practitioners across Tayside and Fife.
- engaged practitioners with a range of self-guided local learning tasks within their own settings
- increased participants confidence in STEM learning and teaching
- increased participants knowledge and skills in STEM subjects and themes
- cascaded learning through sharing practice with peers
- amplified impacts through partnership delivery of a further 8 Professional Learning opportunities involving (196 participants). See Appendix for more details.

Practitioners can deliver educational priorities through STEM By Nature such as Learning for Sustainability and attainment (including enjoyment, engagement and wellbeing). STEM By Nature encourages learning around STEM Skills, a more inclusive approach to STEM learning. More specifically it encourages professional reflection around outdoor learning challenging gender barriers to STEM².

¹ [STEM Choices: Equality and Diversity- Gender](#)

² [Improving gender balance and equalities 3-18](#)

A series of Professional Learning modules has been produced and presented via a mixed-delivery model (incorporating STEM PL survey guidance), with information on each freely shared and hosted on Education Scotland's [STEM Wakelet](#) and a dedicated [John Muir Trust](#) webpage.

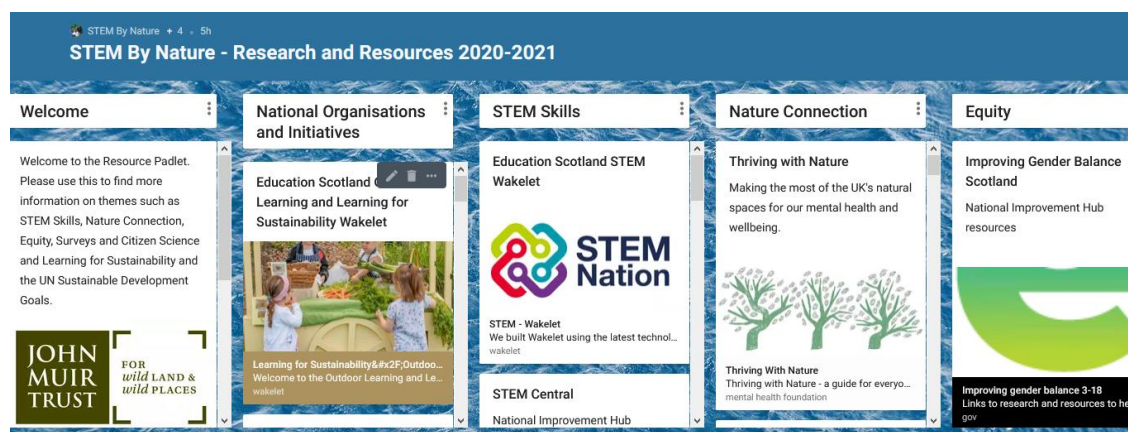
Free to access resources

The STEM By Nature project has produced a suite of downloadable professional learning sessions that are available, covering a range of themes and topics. The sessions have been designed for any educator with schools (primary and secondary), youth and adult groups, or anyone with an education remit or interest.

For links to the Session Guidance see [here](#): including:

- STEM By Nature an Introduction,
- STEM By Nature and Citizen Science – #14 Life Below Water,
- STEM By Nature and Citizen Science – # 15 Life On Land,
- STEM By Nature and # 13 Climate Action,
- STEM By Nature and UN Sustainable Development Goals

For ideas and activities for delivering STEM By Nature in wild places, see the [Information & Resources padlet](#).



Catherine Christie, P6 Teacher at St. Andrews' RC Primary school in Dundee shares her [STEM By Nature professional learning journey](#).

Next Steps

FSC and the John Muir Trust continue to champion the STEM By Nature approach and offer further professional learning where interest is expressed by local authorities and establishments. There is particular interest in the professional learning sessions around Global Goals and Climate Action in the lead up and legacy of COP26. There is scope to develop a self-guided online STEM By Nature course that would be available to practitioners on a national scale and opportunities to work with other partners to develop further modules e.g. geology and landscape.

Origins and evolution

Rob Bushby Consulting brought together the FSC and John Muir Trust to explore the concept of STEM By Nature and help secure funding. STEM By Nature professional learning has been delivered through a partnership between FSC Scotland and the John Muir Trust, supported by Education Scotland's Enhancing Professional Learning in STEM Grants Programme. Scottish Forestry has added its support in 2020-21.

The John Muir Trust and FSC would like to thank Hazel Gardner Hoffman, Education Officer (STEM), Education Scotland for her support and advice throughout the project.

Appendix

Shape of STEM by Nature Professional Learning:

Professional learning was presented via a mixed-delivery model of face to face and online content. The programme includes opportunities for reflective practice through a 'Conversation padlet' (a place to share, reflect and comment on practitioner activity) and a STEM By Nature [Information & Resources padlet](#) (a place to collate relevant and referenced resources).

Phase 1 Pilot: 2019-20 – delivered 157 cumulative hours for 45 practitioners with a blended approach of 4 sessions, 2 in-person delivery and 2 online for each of the Local Authority areas within Tayside Region.

Phase 2 Pilot: 2020-2021 - delivered 92 cumulative hours for 25 practitioners³.

Re-designed in September 2020 to be delivered entirely online and comprised of 4 sessions of 2hrs each, all delivered via Microsoft Teams for Tayside and Fife Regions.

See John Muir Trust news items on STEM By Nature Phase 1 [here](#) and Phase 2 [here](#).

Evaluation and Participant feedback:

The project has been evaluated on an ongoing basis to demonstrate impact, including surveys to identify participants' interests and initial confidence and to help tailor the course content.

Practitioner confidence

100% of responses from participants self-reported an increase in confidence in the areas of: STEM skills, Citizen Science, outdoor learning, understanding Gender balance, nature connection, Sustainable Development Goals, Youth Awards, and Climate Change.

"I just want to say how inspirational the courses have been and have really fired my enthusiasm for outdoor learning. When I think back to the knowledge I had of outdoor learning when I first started the course two years ago to what I know now, its worlds apart! You have made the courses very accessible and interesting, in what is such an important area of the curriculum."

Gaining knowledge and skills

100% of participants felt the CLPL was 'very useful' with the sharing of ideas and resources, as well as the opportunity to see what colleagues are doing with STEM By Nature cited as the most appreciated part.

"I have found the sessions informative, interesting and I am now full of inspiration for learning with my class."

"Signposting and links to resources and ideas for activities. But also links with other initiatives/awards e.g., Young STEM Leader, John Muir Award."

Cascading the learning

Throughout the course, participants have shared, reflected and commented on their activities on a STEM By Nature Conversation Padlet. Most participants said they have been able to share learning from this CLPL with colleagues at their own setting.

³ Nb this was lower than intended due to the global pandemic, with some schools prohibiting teachers from taking part in CLPL, and the unexpected second lockdown in January 2021.

“Sharing practice has been very useful and I would welcome an ongoing STEM By Nature community!”

Partnership outcomes

With STEM By Nature as a concept gaining momentum with other partners, this has helped to amplify the impact of the programme and reach a wider audiences. Some partners have attended the professional learning course, in a train-the-trainer capacity, or have already received support to deliver training.

- Scottish Forestry recruited Rob Bushby to create session guidance to add to the suite of resources: [STEM By Nature – Trees, Woods and Forests](#) (also hosted on the Outdoor & Woodland Learning Scotland website). The John Muir Trust delivered an online webinar for Scottish Forestry on Trees, Woods and Forests (108 attendees).
- East Ayrshire Council (LOST) Team has run STEM By Nature twilight sessions (18) and delivered STEM By Nature training at its ‘Dirty Teaching Weekend’ (23).
- Loch Lomond & The Trossachs National Park hosted a STEM By Nature introduction webinar (10).
- The John Muir Trust delivered a Professional Development webinar for a UK audience (60), and an additional John Muir Award face to face training session for Tayside practitioners.
- FSC Millport delivered a STEM By Nature programme with staff Govanhill High School (14) as part of a residential experience and delivered a pilot outreach programme with Our Lady’s Primary, Perth (24 learners) supporting them to achieve their Young STEM Leader Award through Nature-based activities.

STEM By Nature was co- created by Rob Bushby and Katie Rudge, FSC and Rebecca Logsdon, John Muir Trust.