



# Operation Earth 2.5

## A National Strategic Science Engagement Programme for families and communities

### Final Report

March 31st 2022



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## 1. Executive Summary

The UK Association for Science and Discovery Centres (ASDC) is delighted to be working in partnership with the Natural Environment Research Council (NERC) to create and deliver Phase 2.5 of 'Operation Earth', a national STEM programme which has climate change, environment, and inclusive engagement at its heart.

This programme follows on from the success of ASDC's Operation Earth Phase 1, which engaged 201,639 children and adults, including 37,145 who met and discussed the latest research directly with NERC scientists. Phase 2 continued this success whilst changing the focus on reaching out to local community groups and audiences that hadn't previously engaged with the project. Science centres worked in partnership with 28 community groups, and together engaged with a total of 152,231 through a blended approach of engagements, including remote/at-a-distance and digital during the 2020 lockdown, with a total reach of 339,764 including through social media platforms.

Building on the impressive legacies of Operation Earth 1 and 2, and the strategic partnership with NERC, *Operation Earth 2.5* utilised existing equipment and collaborations, and the expertise of ASDC and the participating science centres and museums, to widen access and bring UK environmental science and research to life - involving and inspiring children and their families across the UK. Key Content Areas focussed on Climate Change and COP26, Biodiversity, Clean Air and Oceans.

The timing of the project was crucial to harness the interest and enthusiasm surrounding COP26, which took place in Glasgow 1-12<sup>th</sup> November and was partly hosted at Glasgow Science Centre, one of the Operation Earth delivery partners. The programme was delivered over a short timescale of 6 months, and at a time when science centres and museums were reopening and restarting their public and schools programming. This phase specifically gave them flexibility to adapt their current programmes and events to incorporate Operation Earth into their current plans, they achieved incredible success in engaging with their audiences on the key topics.

Overall, the ten centres and museums engaged with 67,430 through a mix of in-person, digital and remote delivery as well as a further estimated 60,000 who tuned in to their local community radio shows in Glasgow for an Operation Earth themed show in March.

At the start of this year the project grew even bigger with the introduction of three new centres to the programme. The addition of the three new centres; Exeter Science Centre, Life Science Centre, and Science Oxford, increases the overall geographical reach of the programme to new regions across the UK with delivery taking place in Spring.

Due to the flexibility in delivery this phase has seen a variety of different engagements from big COP themed events to small community workshops and pop-ups in local shopping centres. Engagements have taken place at libraries, as well as STEM boxes being sent out to families and Operation Earth themed radio shows presented by science centre staff alongside their partnering NERC researchers. Dynamic Earth's Climate Science Showcase saw 1,500 people engage with 50 different environmental scientists on the key content themes of Operation Earth including ocean acidification, biodiversity and many more, all held under Luke Jerram's impressive Gaia.

Externally evaluated by Ondata Ltd in a separate report, the impact of these interactions are as follows:

- In terms of the programme's vision, mission and key goals Operation Earth Phase 2.5 has been very successful. The programme has been able to *"engage, inspire and involve*

*families” and to “bring the relevance of the UK’s climate and environmental science and research to life”.*

- Families have reported an increased interest in climate and environmental science, with them intending to go on to read and discuss more about the topics.
- Science centres have been able to empower families to make informed decisions in relation to their own lives, with them seeing the relevance of climate and environmental science.
- Science centres have been supported by ASDC to run high-quality activities, delivered by confident and knowledgeable staff and in many cases in partnership with researchers and other stakeholders.

*“I believe the biggest impact has been visitors wanting to make a real change, and many of them already committing to making small changes for the greater good.” (Science centre staff)*

The Operation Earth mini campaign ASDC wanted to showcase all of this incredible work that science centres and museums were doing to engage with the public on these difficult but urgent themes across the UK. Centres took part in the campaign by taking photos of their activities and posting on social media using the project hashtags. Overall, there were more than 150 tweets relating to the project during the period of COP26, including retweets from MPs such as Kevin Brennan and Sarah Atherton who were invited to visit their local centres to see the work they were doing as part of this project, as well as Sir Patrick Vallance, the Government Chief Scientific Advisor.

Through Operation Earth 2.5, ASDC has partnered with science centres and museums around the country engaging a wide range of audiences, including families, community groups, science communicators and NERC researchers, with the aim of bringing people together on a shared mission to combat climate change by increasing knowledge and relevance of the latest NERC science to people’s everyday lives.

## 2. The Programme vision and mission

**Vision:** To engage, inspire and involve families with school-age children across the UK with the amazing stories, science and people of NERC’s world-leading environmental research.

**Mission:** To enable science centres and collaborating NERC researchers, to reach widely across the UK during COP26 and into 2022, delivering interactive activities through innovative and blended approaches, that bring the relevance of the UKs climate and environmental science and research to life.

Operation Earth is a hugely successful national STEM programme that has been engaging, inspiring and involving families, school groups and communities across the UK since 2018. Since it began, over 350,000 people have taken part in Operation Earth.

Through Operation Earth, ASDC has created a step-change in the way science centres and museums use and share the latest environmental science to engage the public with the issues and challenges around climate change and the environment. This has been achieved by creating a highly inspirational, new and exciting national hands-on environmental science programme and training UK science centres and Museums to deliver it with their communities. Operation Earth is also building mutually-beneficial relationships with researchers. NERC researchers are supporting science centres to embrace more challenging topics around climate and navigate global environmental issues with members of the public. In turn, the inclusive approach of science centres can provide an accessible space for environmental science for individuals who may (for example) have little interest, or be

unreceptive, fatigued or anxious by climate change or climate-change scientists as seen in the media.

Operation Earth 2.5 has built on all the training, knowledge, enthusiasm and partnerships for environmental science and sustainability currently with science centres and museums across the UK. This phased developed and focussed the content of the programme towards celebrating the UKs role in COP26 – particularly surrounding 1st-12th November – as well as other Key Content Areas of biodiversity, oceans and clean air. All partners were required to deliver at least one interaction, activity or event around COP26 to galvanise on the public's interest on climate and environmental topics at this time and help spread the impact across the UK.

### **3. The Impact of Covid-19**

Covid-19 and the repeated lockdowns of the past years have had a huge impact on science centres, forcing them to close and for the majority to lose as much as a full year of income (more in some cases) from public visitors. Across the Science and Discovery Centre Network, alongside the necessary furlough of education, delivery and community engagement teams, redundancies averaged ~30% of the science centre workforce, the most significant impacts for Operation Earth seen when experienced and skilled staff members, with regional knowledge and relationships have been lost.

In 2021 UK science centres and museums re-opened to the public over the summer months, although some not until September. However, they have had to implement restricted opening times to save money on operating costs, as well as coping with a lower footfall when they are open. Despite the lack of restrictions from 19th July in England, science centres are continuing to uphold social distancing measures to support the confidence of returning visitors and nearly all our still operating an advance booking system allowing them to monitor and restrict capacity. Due to the impact of the last two years many of the science centre and museum teams have seen a dramatic loss in staff and most plan to continue to operate like this going forwards.

Nevertheless, despite the majority of science centres being unable to apply for culture & heritage support funds from the Government available to our museums, the whole sector has continued to show itself to be resilient, innovative and adaptable. Centres have pivoted to online and remote delivery of their schools and family programmes, as well as expanding their community programmes to help bridge the digital divide. Examples include working with foodbanks, young carers groups, home educators, and groups supporting young people with disabilities and their families. Operation Earth has been instrumental in supporting some of these blended and innovative approaches to engagement during 2020. Many of these initiatives are set to continue as part of longer-term approaches within science centres to take forward their learning from this type of engagement, as well as creating alternative pathways to engagement to mitigate the impact of any future lockdowns. For this reason, we agreed with NERC to allow science centres and museums applying for phase 2.5 to have the freedom to decide what they would be able to deliver, incorporating the project to complement their programmes and strengthen their plans for re-opening, re-training, reconnecting, and recovery.

## 4. The Programme Key Goals

The key goals for this 8-month programme were as follows:

1. To engage, inspire and involve school-aged children and their parents, carers and wider families with a sense of curiosity and positivity about the UK's environmental research and its applications for the future of our planet.
2. To build on the previous phases of Operation Earth and continue to support science capital for families and communities, using personalised and localised approaches that promote science centres and environmental science as relevant to daily life and something 'for them'.
3. To showcase climate science and COP26 activities across the Operation Earth network, alongside the wider Operation Earth Key Content Areas explored through the activities of Operation 1 and 2: Climate change, Biodiversity, Clean Air and Oceans.
4. To equip science centres to be able to advocate for NERC science within Operation Earth science centres and to amplify the message of climate and COP26-themed regional engagement events to national significance, by creating a mini-campaign that celebrates and advocates for NERC engagement work within science centre's surrounding COP26. Strategic use of digital platforms and social media will aim to engage with policy makers, politicians, and other high-level stakeholders.
5. To train and upskill all participating Operation Earth phase 1 and phase 2 science centres, supporting and empowering their engagement professionals to refresh their knowledge, regroup teams and expertise, and continue with NERC-related engagement activities following prolonged periods of closure and ongoing restrictions due to Covid-19.
6. To increase the knowledge and skills of NERC researchers in delivering public engagement with research and to encourage use of engagement activities and longer-term partnerships between science centres and NERC researchers.
7. To evaluate the programme, including the impact of training for science centres and NERC researchers and the impact of the engagement activities for audiences involved, exploring the perceived relevance of NERC science and research, alongside the effectiveness of various blended approaches of delivery.

## 5. The Key Audiences

The key audiences for this national programme were:

1. Children and young people aged 5 – 14, with a focus on children aged 7 – 10 as an age group that the ASPIRES academic report showed is vital to engage due to early formation of STEM identities. An emphasis of this programme is to include and involve a diverse range of children - irrespective of genders, background and abilities (etc) - with an un-biased approach that engages and enthuses all equally.
2. Parents, carers and wider families of these young people, so they are equally inspired and can encourage their children's learning, interest or career aspirations into the longer term.
3. Science centre and museum professionals in selected centres, and across the wider sector, who can be inspired to include climate science and NERC environmental research across their shows and activities, bringing the impact of Operation Earth 2.5 to a wider national audience for greater legacy.

## 6. The approach from participating science centres

Due to the short timescale of Phase 2.5, running from September 2021 – March 2022, ASDC gave centres more autonomy to propose how they could deliver the project whilst keeping in line with the project vision and mission. ASDC didn't want to put the centres under too much pressure right when they were re-opening and readjusting, with restrictions still in place and a lot of staff changes with their teams. We were therefore more flexible on outputs from the centres not requiring them to engage with specific numbers of people and rather allowing them to tailor their programmes according to their own strengths and networks and for the specific needs and challenges that they and their regional audiences face. They were able to propose what they thought was realistic for their specific situation as each centre is different and had slightly different obstacles to overcome since the pandemic.

It is also important to note that centres and museums are continuing with social distancing measures and using online booking systems for their audiences to book to visit so that they can monitor numbers. Fortunately, there haven't been any further lockdowns and delivery was able to go ahead as planned for the ten delivery partners. This meant that we have seen a large increase in in-person engagement numbers and a decrease in remote and online engagement, although some centres still delivered a mix of the two. For example, Dynamic Earth and Catalyst sent out the popular 'Earthy' STEM boxes again that proved so successful in Phase 2.

## 7. Selecting the partner Science Centres and Museums

Thirteen science centres have previously been equipped and trained in the Key Content Areas through their participation in the different phases of Operation Earth, seven of which\* also completed Phase 2 of the programme. These are listed below with an asterisk next to those that also took part in Phase 2.

1. Catalyst Science Discovery Centre
2. Dynamic Earth\*
3. Eden Project
4. Glasgow Science Centre\*
5. Jodrell Bank Discovery Centre\*
6. National Space Centre\*
7. The Observatory Science Centre
8. Oxford University Museum of Natural History
9. Natural History Museum
10. Techniquest
11. Thinktank, Birmingham Science Museum\*
12. W5\*
13. Xplore! Discovery Centre\*

ASDC ran a condensed selection process inviting all 13 science centres and museums that took part in Phase 1 and/or Phase 2 to apply, including centres that didn't take part in Phase 2. It was the ambition of this programme to include all the science centres and museums listed above in Operation Earth 2.5. regardless of whether they had taken part in Phase 2, so that the programme would have the biggest geographical spread of delivery during such a pivotal year for environmental science and climate change in the run up to COP26. ASDC's aim was to showcase how organisations all over the country were engaging their audiences with environmental science and COP26



expanding the impact and exposure outside of Glasgow, encouraging local audiences to get involved right there in their cities and feel a part of COP26 outside of Glasgow.

The science centres and museums were asked to submit a short proposal with the fundamental Vision and Mission of the programme at its heart and asked them to commit to the following requirements:

- Ensure they produce 2 delivery events between September 2021 and February 2022, including detail of their timelines, with one event in the lead-up to, during or shortly following COP26 (COP26 takes place 31st October – 12th November 2021)
- Explain how the proposal reaches their identified public groups, and include the anticipated numbers of engagements, and balance of in-person, digital/online or remote/at-a-distance engagement methods.
- Explain how they will evaluate the activities (with consideration that ASDC will be working with each participating centre to prepare an evaluation plan).
- Provide a brief overview of their covid contingency plans: how the centre will mitigate against the impact on delivery of future lockdowns and coronavirus restrictions.
- ASDC received applications from ten science centres and museums which were then reviewed by both ASDC and NERC. All ten were approved and contracted to deliver phase 2.5.

## 8. The Ten Selected Science Centre Delivery Partners

1. Catalyst Science Discovery Centre
2. Dynamic Earth
3. Glasgow Science Centre
4. National Space Centre
5. Oxford University Museum of Natural History
6. Natural History Museum
7. Techniquest
8. Thinktank, Birmingham Science Museum
9. W5
10. Xplore! Discovery Centre

ASDC didn't receive applications from the Eden Project, Jodrell Bank Discovery Centre and The Observatory Science Centre due to lack of capacity to be able to take on the project at the time or already having committed to a full programme for the year.

## 9. The Schedule of Operation Earth

This project set out to deliver (and delivered) the following:

2021	
July 2021	Contract agreed between ASDC and NERC
27 <sup>th</sup> August 2021	Kick off meeting: Agreeing the terms of the programme
16 <sup>th</sup> August 2021	Invitation to Participate issued
1 <sup>st</sup> September 2021	Application Deadline
September 2021	Contracting of Delivery Partners

7 <sup>th</sup> October 2021	<b>Operation Earth Online Training Academy and Climate Engagement Showcase</b> - for science centre staff, wider Informal Science Learning and NERC Researchers
8 <sup>th</sup> October 2021	Operation Earth Evaluation drop-in session with Laura Thomas, Ondata Research
October 2021	<b>Delivery of Operation Earth 2.5 begins</b> Themes of Climate & COP26, Biodiversity, Clean Air and Oceans taking place regionally in-person, remotely and online
20 <sup>th</sup> October 2021	Operation Earth mini campaign meeting ASDC Digital and Comms manager Rachael Tapping provided a campaign workshop and toolkit
<b>1<sup>st</sup> – 12<sup>th</sup> November 2021</b>	<b>COP26, Glasgow</b>
November/December 2021	<b>Delivery of Operation Earth 2.5 continues</b> Themes of Climate & COP26, Biodiversity, Clean Air and Oceans taking place regionally in-person, remotely and online
<b>2022</b>	
January - February 2022	<b>Delivery of Operation Earth 2.5 continues</b> Themes of Climate & COP26, Biodiversity, Clean Air and Oceans taking place regionally in-person, remotely and online
March 4 <sup>th</sup> 2022	Reports submitted by delivery partners to ASDC
March 31 <sup>st</sup> 2022	<i>Operation Earth 2.5</i> completes: Main project report finalised and final grants issued to participating science centres.

## 10.Grants to Centres and Budget

The overall budget of the main programme was originally £99,670. This included grants of £4000 for 12 delivery partners, however we had 10 approved delivery partners for this phase, therefore we requested to repurpose the remaining grant money. Each of the 10 delivery partners were awarded a grant of £4,000. This was paid in two instalments, the first in October 2021 and the second on March 31<sup>st</sup> 2022. In addition to the delivery grant we also offered centres a grant of £500. This was to go towards additional costs for the mini campaign for example to use to hire a photographer to capture images for the campaign, or for staff time to put towards the campaign.

The remaining leftover grant money was split across work packages 1 and 6. £2000 was used to hire a PR company to support ASDC with the campaign, providing consultancy for ASDC and a toolkit for the centres to use. The remaining £1000 was moved to WP1 in order to provide budget for more staff time for the ASDC Digital and Communications Manager to organise a campaign workshop for the centres and museums.

### Grant to provide new kit for centres and kit and training of three new centres

In November 2021 ASDC submitted a proposal for additional funding from NERC in order to bring on new science centres to the programme and to provide grants for replacement kit for the already participating 10 partners. This was a wonderful opportunity to increase the network of Operation Earth partners to Life Science Centre, one of the largest science centres in ASDC's membership, to Science Oxford who are now located in 15 acres of woodland, they have plans to use the kit as part of the development of a 3-year Life Sciences, and to Exeter Science Centre, an emerging science centre specialising in environmental science and who work closely with the MET office also based in Exeter and who ran a pop-up climate event in partnership with STFC in March.

The amount agreed was **£22,700** increasing the **total budget to £122,370**.

The first part of the grant was for the current 10 participating centres to replenish and replace Operation Earth kit that had become old, worn, or broken. Each centre submitted a list of equipment they needed to purchase and were then provided with an equipment list of suppliers from the project manager to purchase what they needed with the grant of £500. Only one science centre didn't take this up which was W5 as they felt they didn't need it; this is why the total amount for this part of the additional grant is only £4,500.

The second part of the grant was for Life Science Centre, Science Oxford, and Exeter Science Centre to purchase their own Operation Earth kit. These three centres have shown great enthusiasm in the Operation Earth project, including some attending the Training Academy that took place in October. All three confirmed that they would like the opportunity to be part of Operation Earth as the programme fits perfectly with their current programming objectives during such a pivotal time in environmental science in the UK.

ASDC provided each centre with a £3,000 grant to purchase the kit for the activities they wish to run at their centres and as part of their community outreach work. ASDC also ordered three Earthy Suits so that they can perform the family show, however Science Oxford decided they wouldn't receive an Earthy Suit due to lack of storage space at their centre and knowing that they could easily borrow one from their nearby Operation Earth partner, University of Oxford Museum of Natural History. Thus, it was agreed that ASDC will receive an Earthy Suit to be able to use at future events and to lend to other member organisations when appropriate.

ASDC also provided all three centres with online training in how to use the kit and deliver the family show in February 2022. A small amount of the grant was put towards ASDC internal staff costs to organise and run the additional training academy and remaining external budget from work package 4 was used to hire James Summers and Conor Ellis to train the teams on the equipment, activities, and the family show.

Each new centre signed an agreement with ASDC, the terms of which were approved by Hannah Lacey, they are as follows:

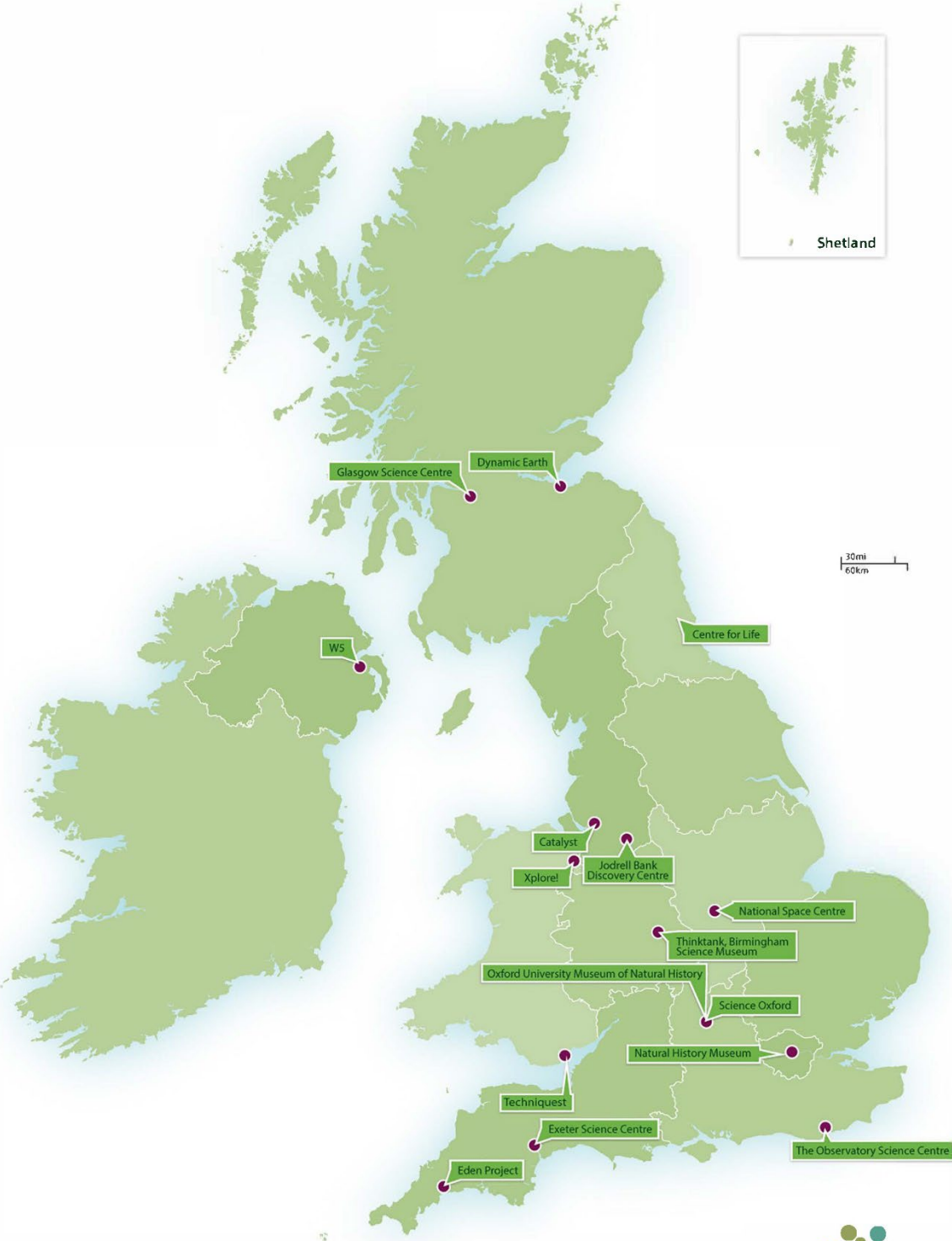
#### **Terms of receiving the grant:**

1. The grant to be used to purchase Operation Earth kit of your choice
2. Engaging in the kit training event, 1st February 2022
3. Branding all engagements and activities correctly with Operation Earth
4. At least one engagement within 6 months of receiving the grant, by July 2022
5. A 1-page evaluation report comprising of:
  - Description of event that took place, who engaged, numbers
  - An interview with ASDC to tell the richer story of the engagement
  - To have been completed by end of July 2022

Please see below breakdown of the additional grant budget of £22,700

<b>Costs for refreshing old kit for Operation Earth partners</b>	
Grant for refreshing old Operation Earth equipment £500 per centre, 9 out of 10 centres requested kit renewal.	£4,500
Total	<b>£4,500.00</b>
<b>Costs for 3 new Operation Earth Kits</b>	
<b>Life Science Centre</b>	
Equipment	£3,000
Earthy Suit	£2,140
<b>Exeter Science Centre</b>	
Equipment	£3,000
Earthy Suit	£2,140
<b>Science Oxford</b>	
Equipment (requested not to have their own Earthy Suit)	£3,000
<b>Training of new Centres</b>	
External costs for training new centres covered by remaining external budget in WP4	£1500 – from remaining external budget in WP4
ASDC staff time to organise in person training event bringing together the new centres delivery leads at an Operation Earth centre	£640
<b>Evaluation</b>	
ASDC staff time to organise Evaluation and carry out one to one interviews with each new centre by the end of July 2022	£1050
<b>Total</b>	
<b>£16,060</b>	
<b>Additional Earthy suit for ASDC HQ to loan to other member organisations upon request</b>	£2,140
This is optional for use by wider science centres, including We the Curious Science Centre (Bristol), as well as providing a spare kit if future replacements are required, or for specific dissemination/celebration events such as at the Bristol Festival of Nature.	
<b>Costs for refreshing old kit for Operation Earth partners</b>	
£4,500	
<b>Grand Total</b>	
<b>£22,700</b>	

# Operation Earth Delivery Centres



[www.sciencecentres.org.uk](http://www.sciencecentres.org.uk)  
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## 11. Research and Development

In the run up to the Training Academy ASDC organised individual meetings with experts who would be able to feed into the development of content for the new phase. We would normally run a charette at the start of a new phase to develop new content however as the focus of this phase was mainly around COP26 and the timing was very late we weren't able to get everyone together at the same time, so we decided to do individual meetings to gather ideas and develop the training academy programme.

Shaaron and Cait met with Hermione Cockburn, Scientific Director at Dynamic Earth and one of the original development partners from Phase 1. Hermione shared information about their recent ATLAS project and the work they have been doing on Oceans and Ocean literacy with their audiences at Dynamic Earth. Hermione also shared with us the Coral Reef biodiversity mat they had developed after the success of the flower meadow mat from Phase 1. We then met with Beth Stone from Natural History Museum and discussed key topics around the themes of phase 2.5, she shared lots of valuable information including the work the museum is has been doing around creating advocates for the planet, empowering their audiences to stand up and make a change. Beth also introduced us to their newest exhibition Our Broken Planet: How we got here and ways to fix it, which explores how humans have transformed the natural world and through the exhibition reveals the consequences of our actions and examines some of the solutions that could help mend the broken planet, thus covering some of the key topics in Operation Earth and a key reason why they wished to join this phase of the programme as the activities and family show align so well.

Cait attended the Communicate Conference: On the Road to COP15 and COP26 on 14th-15th September 2021 where amongst many interesting sessions on climate and COP26 she attended a special workshop run by Caroline Hickman on Eco-Anxiety. 'Eco anxiety is anxiety, worry, or related emotions felt as a response to the climate crisis and its ecological impact' Caroline details how prevalent eco anxiety is becoming in young people who feel not enough is being done to tackle the climate emergency. With Operation Earth dealing with these themes directly and with the majority of delivery focussed on young audiences during biggest moment to take action at Cop26, ASDC felt this would be an essential topic to cover during the training academy for the science centres.

*"73% of young people surveyed in the UK think that the future is frightening. 38% are hesitant to have children because of climate change"*

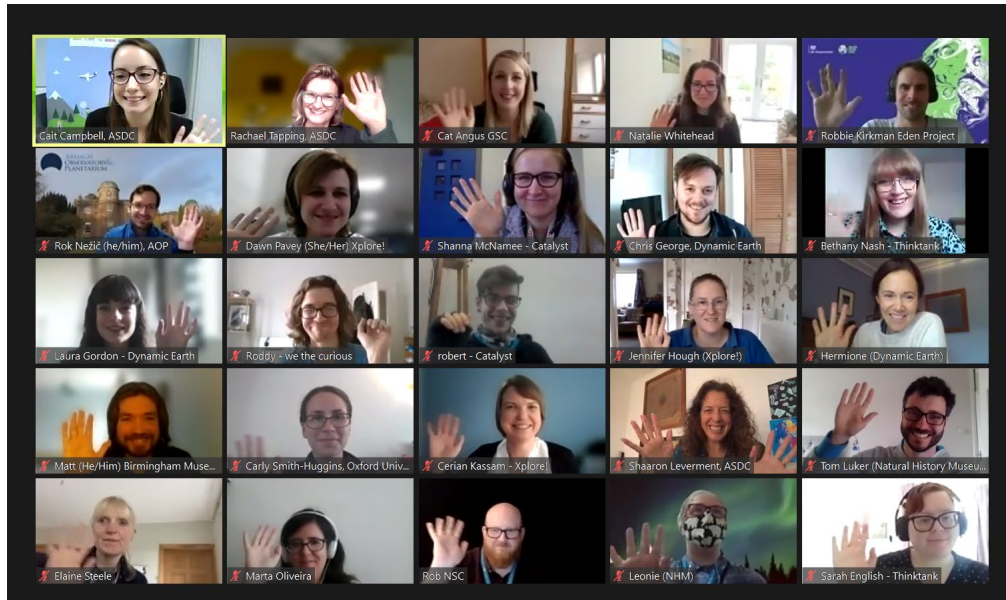
As part of the Operation Earth kick off meeting ASDC invited Alex Brown and Tom Lyons from STEM Learning to offer insight into working with the broader sector including STEM ambassadors. Cait went on to speak with Alex's colleague about collaborating together and inviting ambassadors to attend the Training Academy and Climate Engagement Showcase.

## 12. The Training Academy and Climate Engagement Showcase

ASDC brought together an online event modelled on the 'Training Academy' from previous Operation Earth phases, sharing the latest NERC science on the key content areas of Climate Change, Oceans, Clean Air, and Biodiversity as well as NERC's role at COP26, and training on how to handle these difficult topics with their audiences through a selection of talks from experts in these fields.

The training academy provided an opportunity to revisit and refresh science centre staff's knowledge about the Operation Earth topics and provide an overview of ASDC's expectations for the programme, including guidance in relation to the evaluation. Operation Earth delivery partners were

all required to have at least two members of their team attend both parts of the training academy to ensure training could be passed on to their wider teams. The sessions were also recorded so that staff could watch the sessions again and share with colleagues who weren't able to attend. The ADSC project associate edited the recording into sections and uploaded them to YouTube where you can pick and choose which part of the training you need to re-watch. [Link to Training Academy recording](#)



This year ASDC decided to open up the Training Academy to all ASDC member organisations who may be interested in the themes of the programme and find the training relevant for their staff who will also be engaging the public on these topics. We decided instead of running a separate training academy for NERC researchers as per previous phases, that we would combine the two, facilitating networking between science communicators and scientists in the sector and encouraging working relationships between them. The goal was to spark interest in the project from NERC researchers and facilitate introductions to science centres from the start of the programme. Therefore, at several stages of the training academy the project manager organised break out rooms where delegates were in mixed groups of science communicators, researchers, environmental organisations and professional completely new to the project.

We also encouraged participation from aligned climate-science engagement networks such as Climate Change Educational Partnership and the Natural History Consortium, NCCPE and Stem Learning. With a more open event, our aim was to bring together wider ideas, resources and approaches and collaborate more across the regions of the UK during a pivotal period for environmental science. The Training Academy was a great success and was attended by over 60 individuals from a range of organisations including active Operation Earth partners, other ASDC member organisations, a selection of environment science organisations, and NERC researchers from several universities across the country.

### 13. The Training Academy Programme

The Training Academy was split into two halves, the first half was a more in-depth training session on the programme, content and evaluation with several breakout room sessions where science centre and museum staff were mixed with other colleagues from the sector and NERC researchers in attendance with the aim of giving opportunity to network and build new relationships between

them. The first breakout room gave NERC researchers the opportunity to share what they are currently working on and to ask centre staff about their public engagement. The afternoon was the climate engagement showcase where climate science activities and ideas were shared to spark ideas of new ways to engage the public.

The morning session ran from 10am-1pm and included expert speakers who presented on the latest NERC science related to the Key Content Themes as well as an overview of the Evaluation process, key tips on advocacy and how to take part in the mini campaign, an in-depth presentation on Eco-Anxiety, and an introduction on how to create a framework for inspiring your audiences to become advocates for the planet.

## **ASDC invited expert guest speakers to present on key themes of Operation Earth phase 2.5**

### **Oceans and Ocean literacy**

Hermione Cockburn, Scientific Director, Dynamic Earth

Hermione Cockburn presented on the topic of Oceans and more specifically Ocean literacy - an understanding of the ocean's influence on you, and your influence on the ocean. Hermione also gave an overview of the ATLAS European project Dynamic Earth has been involved in and the ATLAS Educational Outreach Portfolio, which included the development of a new coral reef biodiversity mat that was later shared with all Operation Earth partners and uploaded onto the UK Climate Hub.



In 2014 Hermione took up the post of Scientific Director at Dynamic Earth in Edinburgh. For 20 years previously she worked in a mix of academic and science engagement roles including a brief stint at Dynamic Earth when it first opened in 1999. She has a PhD in geomorphology from the University of Edinburgh and has worked in Australia, Africa and Antarctica researching landscape evolution at the macroscale.

Hermione was also part of the original development team for Operation Earth helping to shape the programme and its content.

### **Biodiversity**

Lukas Large, Curator of Natural Science, Birmingham Museum's Trust

Lukas Large is curator of natural science at Birmingham Museums trust. This role involves caring for a collection which includes an incredible variety of different objects. These range from taxidermy, including 6000 birds as well as their nests and eggs to 153,000 insects, a herbarium and the earth science collection that includes fossil such as the Triceratops skull, minerals and a comprehensive gemstone collection.

Lukas coordinated the Big Brum BioBlitz in 2020 and was due to present on this, how to run your own BioBlitz and wider new themes around biodiversity, however sadly he had to cancel last minute due to health reasons. Fortunately, we had several presentations on biodiversity scheduled in for the afternoon, so the theme was still covered as part of the training.



## Clean Air

Enda Hayes, Professor of Air Quality and Carbon Management, University of the West of England

Enda presented the latest science and studies on clean air including the public health impact of air pollution, emerging Airborne Microplastics and air pollution in indoor spaces. The presentation included new findings on the difference it makes standing away from the edge of a road, walking on the inside of the pavement and planning your commuter route to avoid busy roads and traffic especially when cycling to lower your exposure to harmful levels of pollution.

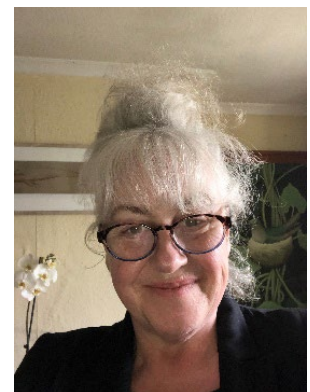
Enda Hayes is a Professor of Air Quality and Carbon Management at the University of the West of England, Bristol. His research sits at the nexus of science, policy and public engagement with a focus on both traditional and emerging pollutants.



## Eco Anxiety Workshop

Caroline Hickman, Psychotherapist and lecturer at University of Bath

Caroline presented her now notorious Eco Anxiety workshop. Sharing her research on the rise of eco anxiety, climate fatigue, and learned helplessness. *“Broken promises and inaction coupled with the enormity of the climate crisis are all beginning to take their toll on children’s mental health.”* ASDC felt this workshop was essential for our science communication teams delivering Operation Earth, not only to understand better the feelings of their audiences, provide them with an understanding of the issue and how to respond when confronted with it, as well as for their own wellbeing and understanding as people working with these topics on a daily basis. The session was extremely well received with a lot of positive feedback coming through evaluation report.



The eco-anxiety session was particularly impactful on science centre staff. It resonated with their own experiences of working with different groups and the session was able to give them some clear approaches to use and incorporate into their Operation Earth activities.

*“It was great to get an insight into the psychology of eco-anxiety and I picked up some tips on how to deal with this with our groups and to make sure they are heard.”* – science centre professional

Caroline Hickman is a psychotherapist and lecturer at the University of Bath researching children and young people’s emotional responses to climate change in the UK, Brazil, The Maldives, Nigeria & USA for 10 years examining eco-anxiety & distress, eco-empathy, trauma, moral injury and the impact of climate anxiety on family relationships. She is lead researcher & author on a 2021 quantitative global study into children & young people’s emotions & thoughts about climate change to be published in The Lancet Planetary Health.

A practicing psychotherapist and board member of the Climate Psychology Alliance she has been developing a range of therapeutic services for ecological distress including a psychological assessment model for eco-anxiety, and delivered workshops in climate psychology, emotional resilience and mental health internationally.

## How can we help children and young people to become advocates for the planet?

Désirée Vaccarini, Senior Audience Researcher, Natural History Museum

Désirée gave an overview of the Natural History Museum's new strategy, a future where both people and planet thrive, and then introduced the group to the museum's advocate engagement model. *"an advocate for the planet is someone who speaks up on behalf of nature and takes action to help create a future where both people and planet thrive."* Désirée also spoke about the museum's newest exhibition 'Our Broken Planet: How we got here and how to fix it'. An exhibition that explores how humans have transformed the natural world.

Désirée Vaccarini is a Senior Audience Researcher at the Natural History Museum in London. Her interests and work span a wide range of topics, from optimising the visitor experience in public programmes, to supporting the museum in understanding its diverse audiences, to researching the most innovative approaches for engaging visitors with the Museum strategy and collections. Désirée is also Co-Chair of the Visitor Studies Group, a membership group dedicated to championing audience research in cultural and heritage organisations.



### Advocacy

Chris Dunford, Head of Environmental Sustainability, UKRI

Chris led the advocacy section of the training academy alongside Rachael Tapping, presenting on how best to engage local partners and stakeholders as part of the national campaign for COP26. He also spoke on building on the legacy of local partnerships beyond COP26.

At the time Chris was Head of Environmental Sustainability for UKRI, leading a team working to embed an ambitious new Environmental Sustainability Strategy across all areas of UK Research and Innovation, including the target of becoming carbon net-zero by 2040.

### Evaluation

Laura Thomas, Evaluator, Ondata Research Ltd

Laura sent a pre-recorded video giving an overview of the evaluation process and the different elements that would be expected of participating centres and museums. ASDC has worked with Ondata Research previously to evaluate our Wellcome funded Project Inspire and Emerging Leaders Programme.

Ondata Research provides research-informed advice and guidance on evaluation and delivers various evaluation and engagement-related consultancy and services to multiple sectors, including education, outreach and public engagement. For more information on current and previous clients please visit our website [www.ondata.org.uk](http://www.ondata.org.uk)

### What is COP26 and what is NERC's role?

Hannah Lacey, Senior Public Engagement Programme Manager, NERC

Hannah Lacey was our keynote speaker for the afternoon session, presenting on What is COP26? And sharing NERC role at COP. Hannah is the senior public engagement programme manager at

NERC. Her responsibilities include designing and delivering NERC grant funding opportunities and other projects which deliver against the NERC public engagement strategy. Hannah has a master's degree in Science Communication and Public engagement and has worked in public engagement with environmental science since 2017.



Russell Arnott from Incredible Oceans presenting at the Climate Engagement Showcase

## 14. Climate Engagement Showcase

In the afternoon ASDC hosted the Climate Engagement Showcase 2pm-3.45pm which showcased Operation Earth hands-on equipment and digital resources as well as inviting a variety of different climate science organisations and researchers to share demonstrations of their activities and resources that could be transferable to wider organisations. We advertised the showcase on the ASDC website as well as sending out an invitation to attend and for those that wished, to apply to do an activity demo. This went out across our membership, newsletter, NERC's mailing lists, STEM learning sent it to their ambassadors, and NCCPE also put out across their network. The showcase was attended by 55 delegates and we had 9 activity demonstrations.

Demos:

1. **Operation Earth Biodiversity Mats:** Laura Gordon, Science Engagement Officer, Dynamic Earth
2. **Operation Earth Air Pollution demo:** Dawn Pavey, Projects Officer, Xplore! Science Discovery Centre
3. **British insects and their habitats:** Chris Jarvis, Oxford University Museum of Natural History
4. **Ocean acidification demo highlighting animal behaviour change:** Russell Arnott, Incredible Oceans
5. **Living Language Land project:** Philippa Bailey, Living-Language-Land
6. **ESA Education Resource Packs, Climate from Space:** Catherine Fitzsimons, NCEO
7. **Heart board pyramid interactive building game:** Nao Haim, Collective Paper Aesthetics
8. **Ocean Acidification demo using universal indicator:** Ben Rutherford-Orrock, Centre for Life
9. **Doers, Shoppers, Shouters' tool for children and young people:** Sam Kendall, Eden Project

The Climate Engagement Showcase included demonstrations from nine brilliant presenters from across the sector including two Operation Earth activity demos and an original and thought-

provoking activity from Incredible Oceans on marine animals' behaviour change due to ocean acidification, which was very popular with delegates and later used by at least one of the delivering centres as part of their Operation Earth workshops. Other highlights included a demonstration from Sam Kendall at the Eden project who talked through their Doers, Shoppers, Learners Shouters tool which enables kids to think about ways in which individuals can respond to the climate emergency. All presenters were then invited to upload their resources to the UK Climate Hub so that they could be accessed and used by the network.



Screenshot from the resource page on the UK Climate Hub

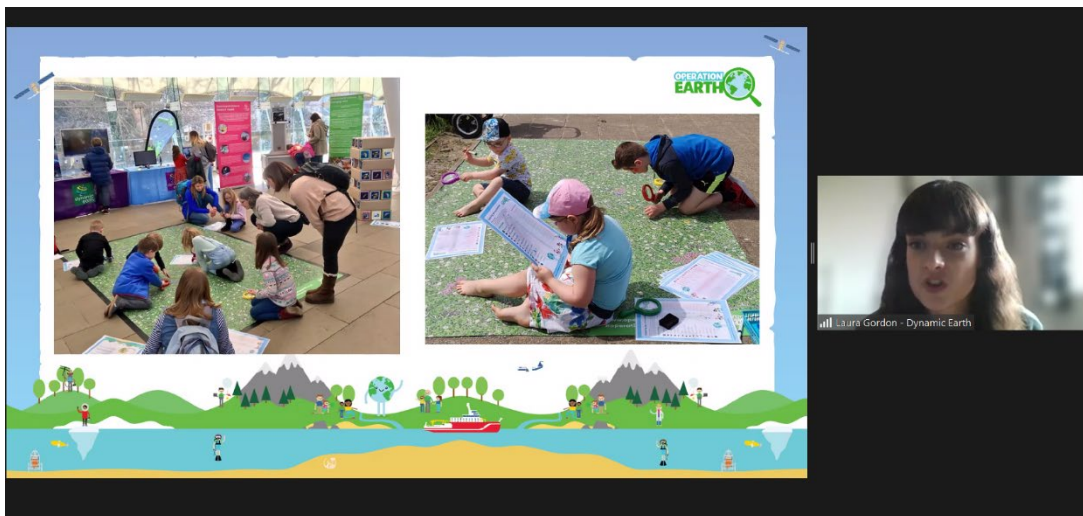


National Space Centre Operation Earth pop up at a library in Leicester showing the Ocean Acidification activity in action



Ben Rutherford-Orrcock, Life Science Centre demo on Ocean Acidification

The key goals of the training academy and climate engagement showcase were to bring together the wider UK public engagement sector in the run up to COP26 to share transferable ideas for events, activities and resources that explore and discuss climate change for school-aged children and their families. Build relationships between delivery partners and NERC researchers. Refresh delivery teams on the content areas of the programme and build on those themes, as well as explaining what is going on at COP26 and how we can all galvanise on this pivotal moment using the Operation Earth programme and activities. Ideas, approaches and inspiring practice were shared for the professional development for science centre staff beyond the original Operation Earth network, and a wider geographical network of science centres, allowing for greater opportunities for connection for NERC researchers in attendance. Eight ASDC member organisations that were currently not delivering the project were in attendance including Exeter Science Centre who later became a delivery partner. Thirteen NERC researchers attended the event allowing us to facilitate networking between project delivery partners and the researchers.



Laura Gordon, Dynamic Earth demo on the biodiversity mats at the Climate Engagement Showcase

*“It’s been great to get a feel for how other centres deliver content, and the activities and sessions that work for them.”* – NERC researcher

ASDC collated all of the new content to feed into the new handbook pages and the activity, resources and events were uploaded to the [UK Climate Hub](#), an online portal created by ASDC to enable everyone engaging the public with climate change to find and share COP26 and climate change activities, resources and events.

Delegates were asked to provide feedback on the training academy and climate engagement showcase, below are some quotes from the evaluation report

- *“eco-anxiety and the type of activities we’re doing and if there’s any cross-over between our delivery - it was great to get to chat!”*. As well as the discussions in the breakout rooms, there was the opportunity for peer-to-peer sharing, as representatives from different science centres shared different demonstrations based on previous Operation Earth phases, which could be used as part of the programme.
- *“We don’t have anything about oceans so far in our list of workshops/shows. It was very helpful to learn a little more and explore what activities could be put into place to approach this.”*
- *“The training academy was brilliant at improving our knowledge and confidence in delivering NERC science.”*

- There was the intention to “cascade” training with science centre colleagues, with the eco-anxiety content being the most commonly referenced as the one they intended to share. By sharing the training with colleagues this also increased the “resilience” of the science centres in terms of the numbers of people available to deliver the activities.

### Additional training sessions

ASDC contracted an external evaluator called Laura Thomas director of Ondata Research to provide an in-depth evaluation of the project and its impact. The evaluation process required several different touch points with the delivery partners and collation of feedback at different points in the programme. Therefore, it was vital that the process was clear to all from the beginning.

Unfortunately, Laura Thomas was unable to attend the academy on the day, so she recorded a detailed overview of the evaluation process, her methods, and the requirements of the delivery partners. In addition to this ASDC decided to host a drop-in evaluation session with Laura so that delivery partners could attend and ask questions about the requirements and process. This session proved very useful and was attended by someone from nearly every centre.

ASDC also organised an additional session on the mini campaign with Rachael Tapping, ASDC Digital and Comms Manager. In the workshop Rachael shared an advocacy toolkit that she had worked on creating with external PR company Seahorse Environmental. The toolkit included a press release template and a letter template to write to a local MP to invite them to attend COP26 related event or workshop, as well as social media strategy and a list of hashtags and tags to use to showcase the campaign and what their centre is doing as part of Operation Earth. Seven out of the ten centres attended, and discussion centred around potential difficulties in inviting MPs, stakeholders and NERC scientists to the centre, ways to tackle these difficulties, advice on how to use the toolkit. One major difficulty that was raised was the timeframe of the project, there was little time between contracting partners and COP26 delivery taking place, this meant invitation for visitors were often declined due to lack of availability from MPS and NERC researchers.

## 15.COP26 and the mini campaign

To galvanise on this pivotal moment where government and the media’s focus is on climate change and COP26 being held in Glasgow and the Green Zone being held at the Glasgow Science Centre, ASDC proposed to run a mini campaign to amplify the impact of the science centre family engagement events and encourage wider members of the public, Informal Science Learning community and higher stakeholders (e.g. policy, Government) to value the contribution which NERC environmental science engagement is making to COP26.

With the additional budget to put towards the campaign, ASDC decided to work with an external PR company to make the most of this opportunity. ASDC chose to work with Seahorse Environment, an award winning fully integrated sustainability consultancy. ASDC were introduced to Seahorse Environmental via the conference Communicate: On the Road to COP15 and COP26, where the founder and managing director Isabella Gornall was a speaker. Seahorse specialise in sustainability strategies, political campaigns and communications programmes which is why we chose to work with them on this campaign for Operation Earth.

The ASDC Project Director and Digital and Communications Manager attended a 1.5 hour session with a Seahorse Account Director and Consultant to answer the following questions:

- a) What is the aim of this campaign?

- b) Who is your key audience, why are you engaging with them and what are you trying to communicate?
- c) How can you best reach that audience?
- d) What resources do you have to do this?
- e) What happens once you have the attention of your audience? What does this mean for your longer-term strategy?

Following the meeting, Seahorse provided a written report outlining their strategic recommendations for achieving the project’s objectives, including key target stakeholders, tactics to secure engagement (e.g. social media engagement, invitations to join activity at their local science centre) and suggestions for maintaining that engagement. Another outcome from the meeting was a toolkit which included a template for writing a press release and a template for inviting local MPs to the organisation.

The main objective of the campaign: **For the public and policymakers to respect and recognise the value of Science Centres and for them to be seen as strategic importance to the Government when it comes to disseminating information around the environment and climate through projects like Operation Earth.**

Success was identified as:

1. MPs, COP26 team and policy makers seeing the COP26 engagement activities run by science centres
2. Engagement with these higher stakeholders on social media
3. A co-ordinated approach to making waves on social media

Through the mini campaign ASDC was able to equip centres to be able to advocate for NERC science as well as themselves and the incredible work they do with the aim that they will continue to use these skills to build upon the relationships created through the project. All the participating centres contributed to the digital campaign tweeting about their Operation Earth activity using the hashtags throughout their delivery of the programme. Two centres were successful in inviting their local MP to visit, and eight out of ten worked with local NERC scientists at their events and workshops. Techniquest in Cardiff received a visit from their MP Kevin Brennan who then tweeted about his visit (pictured below) and Sarah Atherton visited her local science centre, Xplore! in Wrexham (pictured below).



*Tweet from Kevin Brennan MP visit to Techniquest*



*Sarah Atherton MP and Xplore! staff member during her visit*

Kevin Brennan, MP for Cardiff West visited Techniquest to learn about the Operation Earth workshop, spending time with members of the public to discuss environmental policy, as well as having a look at the white boards where visitors shared their thoughts and ideas on topics such as what we can do to reduce waste, what should be done to reduce greenhouse gases and what should be done by policy makers, specifically at COP26. Kevin then re-tweeted the tweet from Techniquest which was then also re-tweeted by Sir Patrick Vallance, Government Chief Scientific Advisor. Sarah Atherton MP for Wrexham has been a big supporter of science centres, she also attended the parliamentary debate that was organised by Ben Spencer during the pandemic which had been a result of the ASDC's campaign [Science Centres for Our Future](#). Sarah visited Xplore! Science Centre during the February half term where she took part in the Operation Earth activities and spoke with the Science Communicators about the importance of engaging young people with environmental issues.

Sarah Atherton MP said: *“It was a wonderful opportunity to see the engagement that Xplore! is facilitating within the local Wrexham community. It really highlighted the importance of engaging whole families around such a crucial issue for the modern world. Wrexham is incredibly fortunate to have an amazing resource like Xplore! Science Discovery Centre in the town centre.”*

Dawn Pavey, Xplore! Projects Officer said: *“As part of the current phase of Operation Earth, science centres involved in the project were asked to engage their local MP. It was fantastic to see Sarah Atherton come along and learn about both the project but also some of the Science Communication that Xplore! is part of.”*

Other notable highlights from the campaign were Greta Thunberg stopping by Natural History Museum on her way up to Cop26, Dynamic Earth's Climate Science Showcase which provided opportunities for 1,500 people to meet and engage with 50 different scientists from across industry and academia including NREC, whilst taking part in a range of hands-on activities and experiences under Luke Jerram's stunning Gaia installation of planet Earth. Also of note was National Space Centre's Operation Earth Festival, which involved several NERC researchers including Dr Neil Humpage who spoke with members of the public about climate science and Earth Observation. Neil also tweeted about his visit which you can see by clicking the image below.



Please follow the link to see more Twitter Moments showing some of the highlights from the campaign. Please note there were over 150 tweets about Operation Earth during the campaign,



however not all of the tweets can be shown here, these were some of our favourites. [Operation Earth campaign](#)

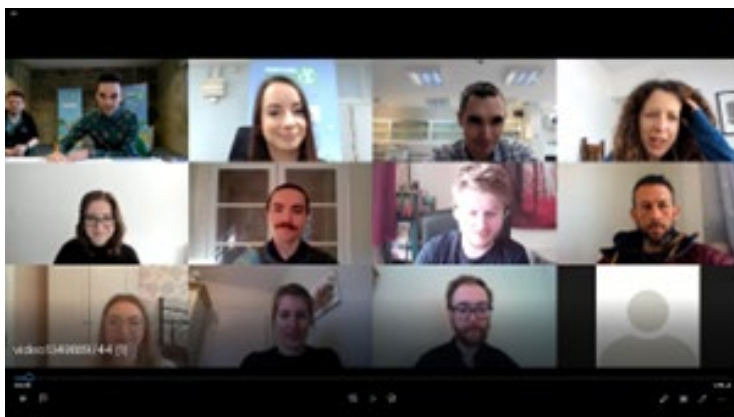
Glasgow Science Centre who was hosting the Green Zone of COP26 developed three videos for the project which were embedded on the Glasgow Science Centre website landing page with COP26 Green Zone info

- What is COP26? <https://www.youtube.com/watch?v=kElRpgbat5E>
- What is Climate Change? <https://www.youtube.com/watch?v=SNIHltAdwNw>
- What is Net Zero? <https://www.youtube.com/watch?v=6EOUCxmSFww>

The videos received many views with What is COP26? Having the most at 7.8K views.

## 16. Operation Earth Kit Training Academy

As mentioned previously ASDC received an additional piece of grant funding from NERC in order to welcome three new science centres to the project. They were Exeter Science Centre, Life Science Centre and Science Oxford. As well as providing the three centres with grants to purchase equipment, ASDC held a second online Training Academy this time focussing solely on the Operation Earth kit, including the Earthy suit and the Family Show. ASDC recruited two Operation Earth kit experts to carry out the online training, James Summers Head of Projects at Techniquet and previous Project Manager of Operation Earth during the development stages of the project, and Conor Ellis Learning and Engagement Officer at Dynamic Earth who also played a key role in the initial development stage of Operation Earth as well as currently delivering the programme at his centre.

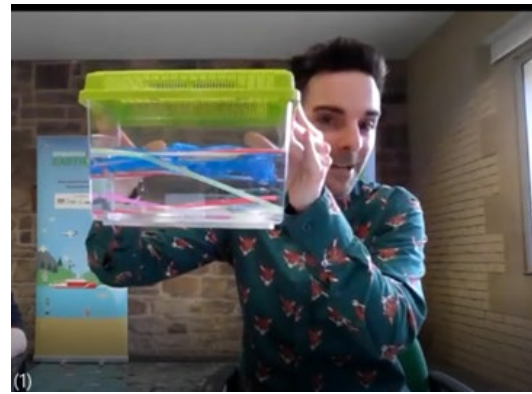


*Screenshot taken at the Kit Training Academy which took place on Zoom*

The training academy provided centres with an overview of all the different operation earth activities and the different equipment available so that the new centres could decide which fit best with their public engagement programmes so that they could then purchase the equipment they needed. It also provided sufficient training on how to run each activity including an overview of the Family Show and its different features, a detailed introduction to Earthy and how to use and store the suit, advice on working with your local NERC researchers, best activities for busking and outreach and numerous pro tips and dos and don'ts from the experts, James and Conor.

The wider Operation Earth network of delivery partners were also invited to send members of their teams, as many had new staff that hadn't delivered the activities before. Some weren't able to

attend on the day however we had recorded the training and shared with them. You can view the Kit Training Academy online [here](#)



## 17.Operation Earth Training Handbook

ASDC worked with Point Creative, who were the original graphic designers for the handbook and website, to add some new pages and content the Operation Earth Training Handbook to share with centres digitally. The Project Manager Cait Campbell worked with Kierann Shah to write up new pages of content from the presentations of the Training Academy. The updated handbook can be downloaded from the website here. Please see list below of the new pages:

### Air

- Air Quality new and emerging areas, pg 77
- Air Quality what can you do, pg 80

### Oceans

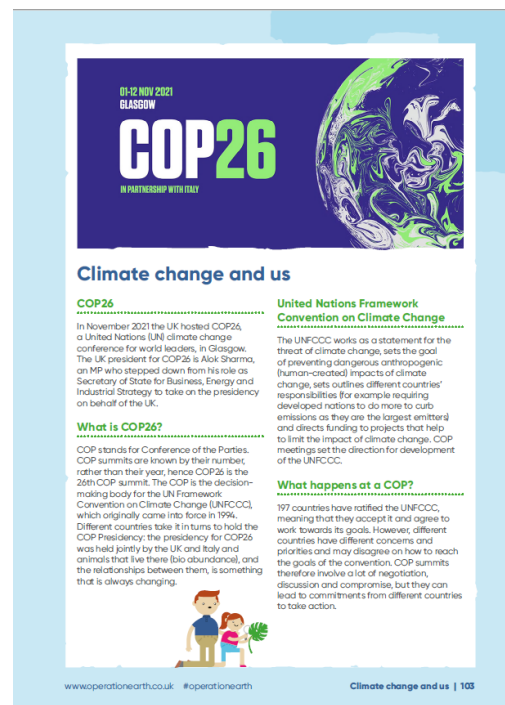
- Ocean Literacy, pg 98
- Ocean Acidification – Behaviour Change Activity, pg 99
- The Deep Ocean and Biodiversity, pg 100

### New section: Climate change and us

- COP26, pg 103
- Climate Advocacy, pg 105
- Eco Anxiety, pg 108

## 18.Operation Earth website and the UK Climate Hub

ASDC worked with [Point Creative](#) to update the Operation Earth website firstly we asked them to make the website more accessible, this entailed changing heading fonts and colours and some of the background colours to create more contrast to improve readability whilst maintaining the brand



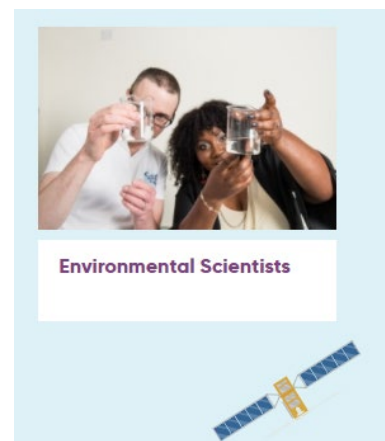
style. A tool we provided them with is a website called [Accessibility Checker](#) that scans the website and highlights problem areas where improvements in accessibility need to be made.

Secondly, ASDC asked Point Creative to assess the digital carbon footprint of both websites. ASDC has been working with a Bristol based company called Sustainable Results Lab, who help businesses reduce their digital carbon footprint. Ruth Smith, the founder and director, ran a session at the ASDC National Conference in November 2021 on ‘The movement to de-carbonise the internet’ and since then we have been working with her to make sure our websites and the websites of our members’ are as low carbon as possible. We provided Point Creative with a guide on [how to reduce your digital carbon footprint](#) in order to go through and assess and edit the Operation Earth website to reduce its overall carbon footprint. These include checking and reducing image sizes where possible, ensuring JPEG minis were utilised and carried out code/script/plugin updates to improve page speed. Point Creative also created a new section on the homepage called Operation Earth in Action! Which showcased tweets from the campaign. This then links to the top twitter moments from the campaign.



## Summary of Operation Earth Website updates

- Accessibility improved
- Digital carbon footprint reduced
- NERC logo updated
- New social media/campaign section added to the home page
- New NERC News stories added
- New resources added – Environmental scientist profiles and videos
- Updated map
- Update to Family Show video



ASDC also worked with Justin Desyallas, [Frisbee Creative](#) to add new resources to the website and UK Climate Hub. These included profiles and interviews with NERC environmental scientists which can be seen here and 25 NERC Climate Change Public Engagement resources, which have been uploaded to the UK Climate Hub and tagged with NERC so that they can be easily found within the resources.

## The UK Climate Hub

The UK Climate Hub was an important tool at the beginning of the project, it provided a space for science centres, museums, environmental organisations, environmental scientists and more to share the events they were planning in the run up, during and post COP26, as well as a platform to upload useful and amazing climate related resources for fellow practitioners and public engagement professionals to use. All the resources that came out of the Climate Engagement Showcase have been uploaded and the event space has a calendar where everyone uploaded their events. See image below:

The image shows a screenshot of the UK Climate Hub website. On the left, there are search results for 'NERC' with 25 results found. Below this, there are three resource cards: 'Using Tree Rings for Past Weather and Climate', 'Jam Jar Geology videos', and 'The Climate Through Time'. On the right, there is a calendar for October 2021 with various events listed for different dates, including 'Our Future Planet', 'Our Broken Planet: How We Got Here and Ways to Fix It', and 'Climate Change Impact: 1.5°C Pathway From Global Warming'.

## 19. Delivery of the programme overview

The delivery period for Operation Earth 2.5 was from October 2021 until the end of February 2022 with at least one engagement taking place during COP26. The majority of the engagement happened in-person face-to face with hands-on activities which was such pleasure to see after two years of the pandemic. Overall, the ten participating centres and museums engaged with over 30,000 people through in-person activities and events and a further xxx through online, digital and radio engagements. Types of engagements included Operation Earth workshops with groups of children and their families, the family show, Earthy/STEM boxes sent out to families through community

groups, Kids STEM clubs, community pop-up events in local shopping centres and libraries, community days, and incredible Climate science events such as Dynamic Earth's Climate Science Showcase which hosted over 50 different climate science organisations and was attended by over a thousand people over one weekend.

One of the key aims of the engagement of phase 2.5 was to continue to support science capital for families and communities, using personalised and localised approaches that promote science centres and environmental science as relevant to daily life and something 'for them'. Each of the delivery partners have demonstrated through their reporting the impact and success as the project has enabled them to have through engaging their audiences with environmental science. Through this project the Natural History Museum focussed on broadening their reach to engage and involve under-served communities, particularly engaging and involving under-represented audiences including children from marginalised ethnicities and from lower socio-economic backgrounds. For example, they hosted their 'Discover Day' in the February half term where they invited community groups they had been working with to come in and take part in the activities, including watching the Operation Earth Family Show. The ASDC project manager also attended on this day and found it really beneficial to see, not only Operation Earth in action, but also how the museum ran their specific community events. On the day there was also one of the museum's local NERC scientists Natalie Cooper, running an on-gallery science station showing different specimens including some of the museum's whale Hope's baleen.



Figure 1 Dynamic Earth's Climate Science Showcase

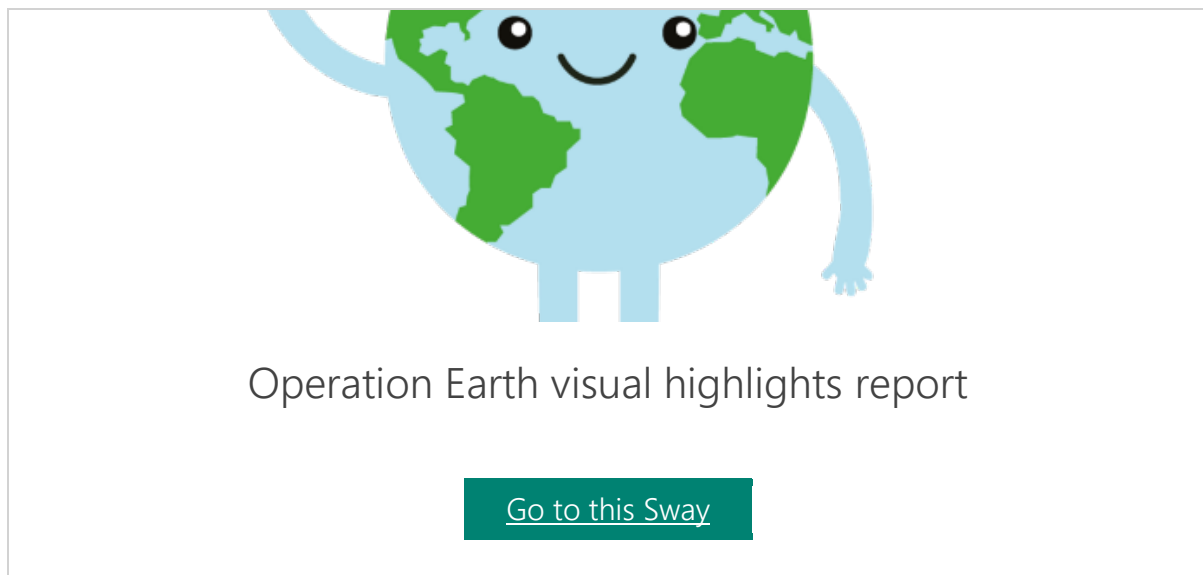
The National Space Centre ran an Operation Earth festival during the week of COP with talks from NERC researchers from the University of Leicester engaging audiences on topics such as renewable sources of energy and encouraging children to become climate superheroes. The Oxford University Museum of Natural History ran their *Super Science Saturday: People and Planet*, a family science fair where researchers and community organisations shared their work. This particular event focused on human impact on the planet and was linked to their current exhibition 'Meat the Future' which looks at the effects of our meat consumption on the planet/other living things.

Xplore! Science Centre ran four weekly sessions at three community hubs based in areas of high deprivation with the aim of creating deeper engagements with families and increase science capital. Through our project community focused project, Explore Your Universe, it has shown that to really have an impact you need to have multiple engagements with the same people run by the same person so it was great to see Xplore! being able to do this.

Techniquest focused on Operation Earth themed workshops engaging with families visiting the centre on the key themes. Alongside the hands-on activities, boards were placed around the busking

area encouraging people to leave their thoughts on what can be done on individual levels and what sort of policies should be enacted. These were used to engage local politicians who visited Techniquest to support the COP26 linked activities. Catalyst and Dynamic Earth sent out Operation Earth themed STEM boxes to their community partners called 'Earthy' boxes and Xplore!, W5 and the Natural History Museum used the Operation Earth family show along with the busking activities to engage their visitors. Glasgow Science Centre filmed videos on the theme of COP26 which they shared during Operation Earth workshops with their community groups, such as the Glasgow Disability Alliance

Please take a look at the Operation Earth sway for highlights of some of the amazing activity that took place in the ten centres across England, Northern Ireland, Scotland and Wales throughout this programme.



## 20. Working with NERC researchers

It has always been important for this project to facilitate building relationships between science centres and their local NERC researchers. In order to facilitate this relationship building in phase 2.5, ASDC decided to organise one Training Academy inviting the science communicators and NERC Researchers to the one event instead of training them on the project separately. We have found in the past that training them separately doesn't give the opportunity to meet and network with science centre professionals and start building relationships with their local centre or museum.

Several of the delivery partners struggled to find NERC researchers to work with on the project, to support them on this the ASDC project manager contacted a list of NERC researchers who had been involved in Operation Earth at some point previously and through that communication was able to connect some of Science Centres with researchers such as Thinktank and the National Space Centre. ASDC contacted National Museums Wales who attended the training academy to see if they could help the Welsh centres and they sent out a message through their network and reached out to the NERC senior public engagement manager, who sent out a message across their communication channels.

Overall, eight out of the ten centres and museums worked with local NERC researchers as part of their delivery of Operation Earth 2.5. The two who didn't were Techniquest and Catalyst, both of which the ADSC project manager tried to help find researchers nearby without success. Catalyst mentioned in their final report that they contacted four NERC researchers they had worked with

previously from the University of Manchester and one student did reply however then were unable to spare time as he needed to prioritise his PhD commitments at that time. Unfortunately, we believe it was particularly difficult for this phase due to the short timescale of the project. Feedback from another centre stated they struggled getting scientists to commit to things especially within a 6month time period and will be something ASDC considers going forwards. It will be important to incorporate NERC researchers in comms at the very beginning of the project so that they are aware that activities and events will be coming up.

#### **Examples of ways participating centres and museums engaged with NERC scientists:**

- Climate Science Showcase event at Dynamic Earth had 50 scientists running stalls throughout the two-day event. More than 50% of contributing scientists at this event were women in STEM research and industry and we were pleased to have diverse representation across researchers at various stages of their careers engage with the public as part of this day.
- National Space Centre Operation Earth Festival had talks by two scientists: Professor Rick Greenough, from De Montfort University, ran a talk to a packed gallery all about planet Earth and the life support systems needed to keep it going and Dr Sandra Lee, from University of Leicester, and she spoke about climate change and encouraged children to be climate superheroes, and look at how they make sure they are helping their environment.
- Dr Neil Humpage was an exhibitor At National Space Centre's festival, showing a range of satellite pictures of earth and discussing how satellites help us to view our planet and understand climate change.
- Natural History Museum worked with NERC researcher, Natalie Cooper who ran a on-gallery science stand during their community 'Discover Day'
- W5 'Sea Life in Colour' events invited Blair Bailie who also currently works at the Exploris Aquarium in Portaferry, as well as Marine Biologist Rosslyn Watret, currently working at Queen's University Belfast to take part. Both guests shared their expertise, with Rosslyn sharing stories of her recent conservation and research trips across the world's oceans, and Blair offering a guided session on how to draw some popular sea creatures, while sharing his considerable knowledge on the subject. Participants had opportunities to ask both experts questions throughout and after the sessions.
- Thinktank worked with experts from University of Birmingham and University of the West of England to help engage visitors and get them thinking about sustainable fashion. They inspired visitors to try out some imaginative ways to give old clothes new life, show how the fashion industry is impacting on the climate, and explore how to our feelings about clothes, fashion and mending relate to environmental change, by making and crafting.
- Xplore! Science Centre collaborated with Dr Russell Arnott from Incredible Oceans, following the training academy, to utilise the ocean acidification behaviour change mix and match activity within the centre.
- Glasgow Science Centre produced a short podcast for community radio as part of their 'Spark of Science' radio series. They co-wrote a piece about icebergs, working with Dr James Lea from the University of Liverpool. The radio piece was aired on 18th March 2022 on radio stations close to the Glasgow Science Centre including Paisley FM and Sunny Govan. They estimate that 60 thousand people from underserved communities listened to the radio piece.
- Oxford University Museum of Natural History collaborated with NERC researchers from the Geoligise Theatre and Oxford University Earth Science department to write and perform songs and musical theatre shows about science taking place at their Super Science Saturday events. The song was about biodiversity and was written for a family audience. [Link](#)

ASDC’s external evaluator received 7 feedback surveys from participating researchers which showed there was a clear development in confidence and skills in relation to communicating with younger audiences. The opportunity to discuss scientific topics was a particularly enjoyable aspect for those taking part: *“Always great to get children asking questions and excited about science and their future career possibilities”* and another researcher commented that the questions they were asked *“showed some serious engagement in the issues from parents as well as children”*. Ondata Evaluation report



Evaluation of Operation Earth Phase 2.5

## 21. Evaluation of Operation Earth Phase 2.5

Year-on-year ASDC has developed its expertise, creative and practical approaches, and academic collaborations that have moved towards greater quality and in-depth evaluation of impact across the sector. For phase 2.5 ASDC set out the goal to evaluate the programme, including the impact of training for science centres and NERC researchers and the impact of the engagement activities for audiences involved, exploring the perceived relevance of NERC science and research, alongside the effectiveness of various blended approaches of delivery. In order to achieve this goal ASDC worked with an external evaluator called Laura Thomas, director of [Ondata Research Ltd](#). ASDC has previously worked with Laura on Project Inspire and the ASDC Emerging Leaders Programme a Wellcome and UKRI funded programme in 2021. Ondata Research specialise in research-led, collaborative and creative evaluation.

ASDC and Ondata Research together supported science centres to capture some core communal measures across the project. A key question that was explored in the evaluation was the concept of relevance and how the perceived relevance of the content of Operation Earth 2.5 to daily life and society impacts the experience of participants and any changes in knowledge or attitude to the themes of Operation Earth 2.5. Emphasis was placed on capturing the experiences of the participants and the science centre staff delivering the projects, through the promotion of reflective practice.

### Methodology

The evaluation for Operation Earth Phase 2.5 has been flexible and pragmatic and Mixed Methods approach was used. This mixture of quantitative and qualitative methods incorporated existing tools already in use in science centres and new tools developed by Ondata Research specifically for this programme.



ASDC worked with Ondata Research to put together an evaluation plan with multiple touch points with the science centre and museum teams throughout the short timeline of the project. Please see below the Evaluation timeline for the project, each centre was required to complete every element of the evaluation process, as agreed in their contract.

Due date	Item	Description	Purpose
15 <sup>th</sup> October 2021	Post-training reflection.	Short set of questions for attending staff to answer.	To allow us to gain an understanding of the impact of the training programme.
	Provide responses to evaluation actions.	A set of questions can be found at the end of this document for your attention.	To ensure you have understood the evaluation requirements and have had the chance to ask questions before the first activities run.
6 <sup>th</sup> December 2021	Post-COP26 event reflection.	Short set of questions for lead staff member to answer on activities linked to COP26.	To provide an opportunity to gather feedback on the activities so far and a snapshot of initial feedback from visitors.
4 <sup>th</sup> March 2022	End of project reflection.	Short set of questions for lead staff member to feedback on participation in project as a whole.	To provide us with an overview of your experiences participating in the project and the impact it has had on your, your colleagues and visitors.
	Metrics.	A template has been provided for you to record all relevant activities.	To allow us to establish the reach of the project.
	Survey responses and any other evaluation data.	A common set of survey questions have been supplied to allow data to be gathered from all participating centres. A template feedback form is provided for adaptation. We are happy to receive any additional evaluation data you may have gathered in relation to the event.	To provide direct feedback from visitors on their experience participating in Operation Earth activities.

The centres were provided with three different evaluation tools to use:

- Three staff self-reflection surveys: post-training, post COP26 activities, and end of project reflection
- Audience survey questions to complete after activity/event
- NERC Research self-reflection survey questions

For each of these tools ASDC worked with Ondata Research to create the right set of questions to ensure the right information was being gathered, however if centres wished to use their own surveys or feedback format, they were requested to submit these for approval at the start of the project to ensure they were still capturing similar data. The Survey tools are included in the appendices.

As well as the above the delivery partners were required to complete a Metrics table in order to gather qualitative data from their engagements. Metrics table template included in the appendices.

## Audience feedback

ASDC were delighted to hear many of the centre reporting that Operation Earth engagements had inspired audiences to make changes to their everyone lives. Here are a few examples:

- *"This event inspired children and their families to make small changes to their lifestyle that will help our planet. One participant noted – "I need to switch off more electronic devices at home, I hadn't thought that this would have mattered as much as it does." –from Richard (A Dad's comments after the event at W5*  
*"From the food activity I am more aware of what eating cheese does to the planet. So try and find alternatives."- Family participant with children at the National Space Centre*  
*"It helps us to understand how our lives impact on the planet." – Parent at Oxford University Museum of Natural History*  
*"change climate change so we can all live a happy life and not worry about anything' Lily-Mae, age 10*  
*'have more people that recognise that climate change is a big deal and do more about it' Sophia, age 13*  
*'like to see less waste and more smart use of the Earth's resources. Balance needs to be restored' - Clair, age 32*  
*"Your workshops are always so successful and well received here at the Factory, please could you let me know if you have any availability for more workshops this year as I'd love to book some in before everyone else books you!" - Organiser for Valley Kidz, an organisation based in Porth*

## Science centre and museum staff feedback

The centres and museums shared great feedback from the audience and science centre staff surveys. For example, one science centre member of staff said, *"I believe the biggest impact has been visitors wanting to make a real change, and many of them already committing to making small changes for the greater good.* "Other feedback included:

- *"I always love seeing our younger visitors enthralled for such a long time investigating the Biodiversity Mat, looking for and identifying as many species as possible and counting them up so diligently. It's amazing what they see when they look up close and take the time and such a great vehicle to have a conversation about how they can do that anywhere they go – first steps to becoming an advocate for the planet!" – Beth Stone, Head of Learning & Audiences, Natural History Museum*
- *" This activity helped to engage families with a marine biologist and allow them to learn about the vast biodiversity of our planet, as well as our own back yard. It showcased climate science and the issues being highlighted at COP26 and, very importantly, how this relates to our everyday lives" – Shanna W5*
- *"We love the Operation Earth programme and maximise all opportunities to ensure it's success for all parties. We're limited only in terms of staff capacity and what the grants associated with the project enable us to deliver. It is always really useful to use that we can spend grants flexibly on a variety of areas and if future iterations of the project can maintain*

*this flexibility that would be great!” Science Communicator W5*

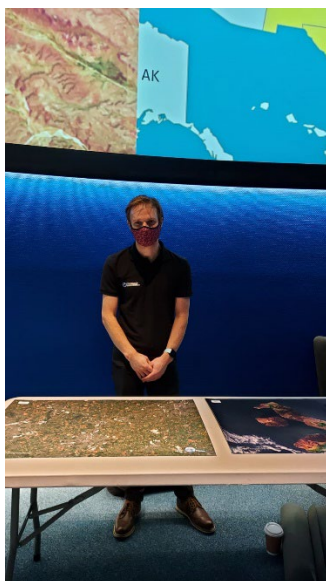
- *Our widening participation and community engagement programmes have improved access and equity to climate change programming both at the centre and through outreach. All our programmes were participatory and in-person person which actively involved and empowered audiences - and they all provided opportunities for families to meet real scientists, including NERC researchers” Science Communicator, Dynamic Earth*
- *“We had a lot of questions about political policies and how would small changes make a difference. It would be good to be able to offer advice on have to approach larger scale changes for the future.”*

### NERC Researcher Feedback

When asking Researchers What motivated you to get involved with this session? Has the experience met your expectations? They responded:

- *“I wanted to try to find a way to explain my research to kids the same age as my own!”*
- *“We've had participated on similar events, such as Royal Society Summer Science Exhibition, Bluedot Festival, Science X etc. Our aim is to get the message on how food system has an impact on people's and planet health and we are very enthusiastic on engaging with the public. Definitely, met the expectations.”*
- *“It's part of my job to communicate my research to the public. Yes.”*
- *“A desire to communicate the benefits of renewable energy to families and young people in a setting relevant to the development of solar PV and hydrogen fuel cells”*
- *“I thoroughly enjoyed taking part in this activity. It gave me an opportunity to be creative and share a subject I love with children.”*
- *“I am passionate about communicating environmental science to young people and kids through musical theatre and I was glad of the opportunity to write about biodiversity for the museum. Writing and performing the song was fun and rewarding.”*

Please see the Evaluation Report for information on the findings from the qualitative and quantitative data collected by OnData Research Ltd.



*Dr Neil Humpage at National Space Centre*



*Professor Rick Greenough, from De Montfort University speaking at Operation Earth Festival, National Space Centre*

## Additional Evaluation of Three new Centres

Operation Earth 2.5 welcomed three new science centres to join in the later stages of the programme due to receiving additional funding from NERC. Therefore, ASDC is working with Ondata Research again to produce an additional evaluation report which will land in July 2022 after the new centres have had the opportunity to deliver. Ondata Research will carry out interviews with each centre in July and centres will be required to complete a brief evaluation report. The aim of the evaluation will be to find out how positive the overall experience has been for their teams, whether they received enough training and support to be able to deliver their chosen Operation Earth activities, difficulties and challenges faced, successes – what worked well and finally how they plan to use the equipment going forward.

### Please see below schedule for the three centres

January	Science Centres are contracted, and grant invoices received
February	Science Centres attend a Training Academy (1 <sup>st</sup> February)
February	Ondata and ASDC to agree on an Evaluation report template/ metrics table and send out to Science Centres
March-mid July	Science Centres delivering Operation Earth activities
15 <sup>th</sup> July (tbc)	Science Centres to complete Evaluation report and have interview scheduled
August	Evaluation Report by Ondata completed and sent to ASDC



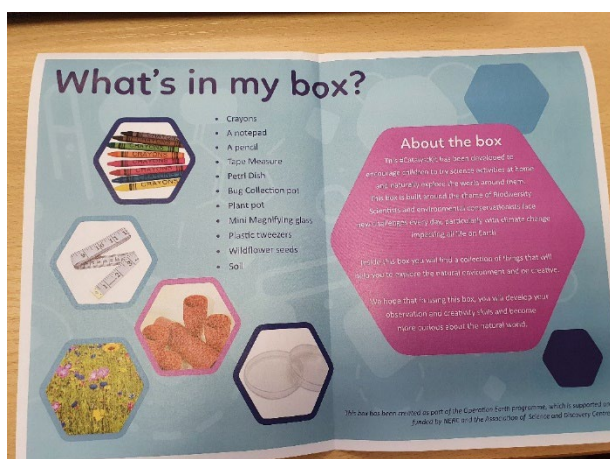
*Tweet from Exeter Science Centre's Climate Science pop-up event in March 2022*

## 22. Legacy of Operation Earth

ASDC asked for delivery partners to share the legacy of Operation Earth in their final reports. Below we have included this section from those reports for each partner.

### Catalyst

Our biggest legacy stemming from Operation Earth 2.5 was inspiring local children to consider and take an interest in climate and environmental science. Our local community is within 10% most economically deprived areas nationally, and much of the work we are trying to do within these communities is to support and provide them with the tools needed to encourage participation in STEM topics. Catalyst are ambassadors that promote STEM being for everyone, regardless of educational background or scientific proficiency. As a result of our Biodiversity Science Capital boxes, we have developed and are nurturing a relationship with a local primary school that hasn't visited our Centre in over 16 years. Feedback from the children (aged 8-11) and teachers following our preliminary outreach session involving The Planet Awakens activities highlighted a new and inspired interest in the topic. Many of the children remarked that they would like to work with us again, or even visit our Centre with the school or their families. This greatly fulfils our ambition to grow our audience.



Feedback for the boxes was wholly positive, with 83% of the pupils completing the experiments with family members. 100% of these children felt that their family members enjoyed the experiments as much as they did. Most of the activities were hugely popular – it was the hands-on, creative tasks that dominated the feedback. Many remarked that they loved being outdoors and taking on the role of scientists, which is fantastic. Their teacher further commented that many saw this activity as an opportunity to take on a more active and positive role in their local

community. Distributing the boxes through a local primary school was an alternative way for us to engage with families and young people, however it did come with challenges as motivation for the boxes can decline once out of our control. We have learnt from this and considered ways we can increase engagement going forward. Overall, we consider our boxes to be a resounding success.

Our participation in Operation Earth 2.5 has consolidated a successful family workshop and show for us to deliver to families and young people. We feel that we have succeeded in our aim to meet the project's vision and mission as Operation Earth was offered to a substantial number of the intended and targeted audience. The success of The Planet Awakens now means that Catalyst has a solid educational workshop that can be delivered in the future – one that approaches climate and environmental science in a fun and appealing way. Over the course of the project, it had been trialled with members of the public and a local school, and feedback dictated that it was a very popular and engaging STEM experience.

## Dynamic Earth

Dynamic Earth has embedded kit from the original phases of Operation Earth into our core portfolio of school and community programmes. We were very grateful for the recent grant of an additional £500 which has allowed us to refresh kit that needed replaced and improve flexibility with how we use kit in COVID times to minimise kit sharing and deliver enhanced cleaning between uses.

We continue to work regularly with NERC colleagues and researchers as part of our year-round public programmes and Operation Earth provides another useful context for this engagement.

Our Learning and Engagement team continue to support ASDC and fellow science centre network colleagues in the delivery of Operation Earth programmes through initiatives such as national training academies.



*Selection of photos of kids receiving Earthy Boxes from Dynamic Earth*

## Glasgow Science Centre

With funding from Operation Earth, we developed videos about COP26 and climate change that we can re-use as part of any event such as the pop-up shop we held in February. We can disseminate the videos through a range of potential media including the big screen outside the science centre. We also developed activities such as newspaper plant pots that we can re-use with community groups to demonstrate how to grow plants in a sustainable way. Glasgow Science Centre's staff have acquired new skills and knowledge that can be used in subsequent programmes.



*What is COP? Video screening with Glasgow Disability Alliance Newspaper pot plants – growing tomatoes*

### National Space Centre

As part of the project we created to oceans board, the food for thought busks, fishing for our future busk and a programme of home school activities and adapted workshops. These programmes are things we can offer for other events, such as Earth Day but also for more long-term engagement with schools and home school visitors as well as continuing to use for our family visitors.

National Space Centre have also mentioned that their new exhibition Home Planet will feature a lot of the key themes and learnings from Operation Earth.



*Charlie Isham dressed as Earthy at one of their community library partners*



*Earthy with refill Revolution at their Operation Earth Festival*

### Natural History Museum

Following the adaptation of the Operation Earth show to one-person delivery (thus making it more sustainable), as well as the training of more staff through the programme, we will be able to include the show in our regular family and community programming during holidays and weekends going forward.

The Biodiversity Mat activities are very popular and effective for engaging our younger audiences with biodiversity too and so will be a regular feature. We will be looking to create more opportunities to connect researchers with the public out on the gallery floor as well as online through social media and digital resources, optimising our onsite and online reach.



*Operation Earth Family Show at the Natural History Museum during their Discover Day in February 2022*

### Oxford University Museum of Natural History

The Museum will continue to feature aspects of environmental science in our family programming. The Museum also feels that it is important to start to create a network of NERC researchers to deliver more of our family programming so that families have more opportunities to interact with real scientists. One aim was to try connecting these researchers with community groups that the Museum works with or plans to over the next few years.



*Three photos of Operation Earth busking activities at Oxford University Museum of Natural History across several events*





## Techniquest

The importance of science centres as advocates and points of contact for policy makers and stakeholders of that ilk will be taken forward. The interest expressed by councillors and MPs was positive even if very few could make it this time. Being able to place ourselves as ways for policy makers to better understand those they serve is invaluable and will enhance the value of science centres around the UK.

Operation earth will continue to be a useful workshop for bringing out both on the exhibition floor and to community groups as environmental science has proven to be a popular topic through conversations.



*Operation Earth workshop at Techniquest*

## Thinktank, Birmingham Museums Trust

We plan to deliver the Operation Earth show throughout the Easter Holidays to link in with Our Changing Planet gallery. This will be supported by Climate Busking led by our Enabler Team both over the Easter Holidays and during weekends.

We will also be delivering the Operation Earth show at the celebration day of the Urban Nature Project.



*Luke Jerram's Gaia at Thinktank with Operation Earth busking activities*

## W5

Our Learning Team intend to continue to deliver In Your Nature and Sea Life through a Lens as part of our Science Bar activities and pop-up busking. We will also endeavour to create more 'Sea Life in Colour' events in the near future. We intend to edit the Live Teams event footage so that it can be used as a video at the Science Bar in W5 and participants can come along and join in from the exhibition floors.



*Please note, this photo is not cleared to use on external websites*



*Operation Earth Family Show at W5 Sea Life in Colour event on 15th Feb 2022*

## Xplore! Science Centre

Xplore! will utilise the equipment and activities from Operation Earth with families again. As a theme for our public programme, but also as an option for sustained future family-learning sessions in our centre.

Local councils are pushing for more schools to offer family-learning sessions linked to the curriculum in Wales, therefore Xplore! will utilise the Operation Earth resources to engage pupils and their families out in schools and community venues, as requested.



*Left image: Photo of children playing the Ocean Acidification game from Incredible Oceans  
Right image: Sarah Atherton Wrexham MP engaging in Operation Earth activities at Xplore!*

## 23. Appendices

### Appendix 1. Training Academy Programme



## Training Academy for Phase 2.5

### Programme

Thursday 7<sup>th</sup> October 2021

9.30am-12.30pm

&

## Climate Engagement Showcase

2pm-3.45pm

on Zoom

09.15am	Welcome Introductions to the Project Team	Cait Campbell, ASDC
	Introductions from science centres and museums running Operation Earth	All delegates
9.25am- 9.45am	<b>Operation Earth 2.5 overview</b> - Introduction to phase 2.5 - Resources - Evaluation process	Cait Campbell  Shaaron Leverment, ASDC
9.45am- 10am	<b>Operation Earth Advocacy and Mini Campaign</b> - How to engage local partners and stakeholders - Operation Earth mini campaign around COP26 - What ASDC needs from project partners	Chris Dunford, UKRI & Shaaron Leverment & Racheal Tapping, ASDC
10.00 - 10.40	<b>Introductions to the Key Content areas:</b> - Oceans - Hermione Cockburn, Dynamic Earth - Clean Air - Enda Hayes, Clair City - Biodiversity - Lukas Large, Bio Blitz	Guest speakers
10.40am	Breakout rooms	
<b>10.50am</b>	<b>Break</b>	
11am- 11.40am	<b>Eco Anxiety Workshop</b> An introduction to Eco Anxiety with Caroline Hickman, psychotherapist and lecturer at the University of Bath in social work and climate psychology.	Caroline Hickman, University of Bath
11.40am- 11.50am	Breakout rooms	

12.00pm - 12.25pm	<b>Natural History Museum</b> <ul style="list-style-type: none"> <li>- Developing an advocate engagement model framework: inspiring, informing and empowering advocates for the planet</li> <li>- Key elements of research into Gen Z and Gen Alpha.</li> <li>- Key learnings from 'Our Broken Planet: How we Got Here and Ways to Fix it' exhibition</li> </ul>	Desiree Vaccarini, Natural History Museum
12.25pm	<b>Closing summary</b>	
<b>12.30</b>	<b>Close</b>	
12.30pm-12.45pm	Optional open forum to continue discussion and ask any questions	
	<b>Climate Engagement Showcase</b>	
2pm	Welcome and Introductions	Shaaron Leverment & Cait Campbell
2.10pm	<b>Natural Environment Research Council's role at COP26</b>	Hannah Lacey, NERC
2.20pm	<b>Climate Engagement Showcase</b> <ol style="list-style-type: none"> <li>1. Laura Gordon, Dynamic Earth</li> <li>2. Dawn Pavey, Xplore! Science Discovery Centre</li> <li>3. Chris Jarvis, Oxford University Museum of Natural History</li> <li>4. Russell Arnott, Incredible Oceans</li> <li>5. Philippa Bailey, Living-Language-Land</li> <li>6. Catherine Fitzsimons, NCEO</li> <li>7. Nao Haim, Collective Paper Aesthetics</li> <li>8. Ben Rutherford-Orrock, Centre for Life</li> <li>9. Sam Kendall, Eden Project</li> </ol>	Presenters from across the sector
3.40pm	<b>UK Climate Hub</b> Call to all to upload your resources and events <a href="https://climatehub.uk/">https://climatehub.uk/</a>	Cait Campbell, ASDC
<b>3.45pm</b>	<b>Close</b>	
3.45pm-4pm	Optional open forum to ask questions and allow any further discussion	

## Useful Links

- [Operation Earth website](#) – News, Resources, Training Videos, Marketing Materials, Digital Activities, and much more (this is in the process of being updated for Phase 2.5)
- [Operation Earth Online Resources](#) – a selection of great online climate change digital resources, all project branding materials, Operation Earth Kit information, and NERC news stories.
- [ASDC website: Operation Earth](#) – for project announcements, organisation information, Phase 2 Full Report, and more.





## Operation Earth Kit Training Academy Programme

Tuesday 1<sup>st</sup> February 2022

10am- 1.15pm via zoom

Chaired by Cait Campbell Project Manager, ASDC

**Facilitated by**

James Summers Head of Projects, Techniquist

Conor Ellis, Learning Engagement Manager, Dynamic Earth.

Zoom Link: <https://us02web.zoom.us/j/87247078957?pwd=eEl2cHBObTAzeGFhb0pRYy93T1Y4QT09>

10am 10mins	<b>Welcome &amp; introductions</b> - Who's Who? Who does what?	Everyone
	<b>Introduction to Operation Earth</b> <ul style="list-style-type: none"> <li>• What the project has achieved so far/brief summary</li> <li>• Phase 2.5 Vision and Mission</li> <li>• Key themes (NERC science)</li> <li>• Operation Earth delivering partners - map</li> </ul>	Cait Campbell, Project Manager, ASDC
	<b>Resources &amp; where to find them</b> <ul style="list-style-type: none"> <li>• Handbook</li> <li>• Operation Earth Website</li> <li>• Branding guidelines</li> <li>• Online activities</li> <li>• Previous training academy recordings</li> </ul>	Cait Campbell
	Q&A	
10.30am	<b>10 minute Break</b>	
10.40am	<b>Kit &amp; Themes Training</b>	
	<b>Land</b> – Stories, Science and Kit	James Summers & Conor Ellis

	<b>Air – Stories, Science and Kit</b>	
11.40am-11.50am	<b>10 minute break</b>	
	<b>Oceans – Stories, Science and Kit</b>	<b>James Summers &amp; Conor Ellis</b>
	<p><b>The family show</b></p> <ul style="list-style-type: none"> <li>• Overview of the concept and themes</li> <li>• what activities are included – how they can be used individually</li> <li>• next steps and encouraging audiences to engage with citizen science projects</li> <li>• 1 Vs 2 presenters</li> <li>• Troubleshooting &amp; Top Tips</li> </ul> <p><b>Meet Earthy</b></p> <ul style="list-style-type: none"> <li>- Set-up</li> <li>- Storage</li> </ul> <p>Tips and Tricks</p>	
	<p><b>Other topics to include examples and mini discussion</b></p> <ul style="list-style-type: none"> <li>• Outreach</li> <li>• Additional items you may wish to explore e.g UK Climate Hub</li> <li>• Meet the Scientist – working with NERC scientists e.g. Dynamic Earth COP26 Climate Showcase</li> </ul> <p><b>Closing Thoughts/Q&amp;A</b></p>	<b>James Summers, Conor Ellis &amp; Cait Campbell</b>
<b>1:15pm</b>	<b>Close</b>	

### Delegate List

Cait Campbell	Project Manager (Chair)	ASDC	cait.campbell@sciencecentres.org.uk
Shaaron Leverment	Project Director	ASDC	shaaron.leverment@sciencecentres.org.uk
James Summers	Projects Lead	Techniquest	james@techniquest.org
Conor Ellis	Learning Engagement Manager	Dynamic Earth	conor.ellis@dynamicearth.co.uk
<b>Delegates</b>			
Jennifer Shufflebotham	Learning and Engagement Manager	Birmingham Museums Trust	jennifer.shufflebotham@birminghammuseums.org.uk
Ruairi Fraser	Learning and Engagement Officer	Birmingham Museums Trust	ruairi.fraser@btinternet.com

Ruth Millett	Learning and Engagement Officer	Birmingham museums trust	ruth.millett@birminghammuseums.org.uk
Ben Rutherford-Orrock	Contemporary Science Manager	Centre For Life	ben.orrock@life.org.uk
Callum Griffiths	Digital Producer	Centre for Life	callum.griffiths@life.org.uk
Jake Morton	Science Explainer	Centre for Life`	jake.morton@life.org.uk
Alice Mills	Director	Exeter Science Centre	alice@exetersciencecentre.org
Natalie Whitehead	Director	Exeter Science Centre	natalie@exetersciencecentre.org
Grace Macmillan	Public Engagement Programme Manager	NERC	grace.macmillan@nerc.ukri.org
Emily Fisk	Centre Operations Manager	Science Oxford	emily.fisk@scienceoxford.com
Roger Baker	Outdoor Learning and Ecology Manager	Science Oxford	roger.baker@scienceoxford.com
Emily Fisk	Centre Manager	Science Oxford	emily.fisk@scienceoxford.com
Daniel Scholes	Science Oxford Centre Officer	Science Oxford	daniel.scholes@scienceoxford.com

### Useful Links

Website:

<https://www.operationearth.co.uk/>

Resources:

<https://www.operationearth.co.uk/resources/>

Branding Guidelines:

<https://www.operationearth.co.uk/toolkitcategory/branding-and-marketing/>

Operation Earth Phase 1 & 2 Reports:

<https://www.sciencecentres.org.uk/projects/operation-earth/reports/>

UK Climate Hub:

<https://climatehub.uk/>

NERC News:

<https://www.ukri.org/councils/nerc/news/>

## Appendix 3. Evaluation Tools

### *Evaluation tools*

There are three different tools available for you to use:

1. Family survey questions.
2. Self-reflection questions for staff.
3. Self-reflection questions for researchers you are collaborating with.

### *Survey questions*

- The following sets of survey questions are for use if you are running workshops or themed days in the centre/museum. If you are running a workshop as part of a themed day then we do not expect you make the survey available twice, just use as part of gaining feedback on the whole visit.
- You can use the following sets of questions to prepare digital survey forms with Operation Earth branding alongside your own. Please also remember to include the appropriate GDPR declarations based on your own policies and processes. We understand you may want to add one or two questions depending on other information you may require.
- Please try to collect the responses digitally by providing the link at the end of workshops or around the centre as a QR code during a themed weekend, or as a follow-up to the visit. If you do collect responses via paper forms then these will need to be entered into a spreadsheet before being returned to ASDC.

**Questions:** For activities with a family audience please ask an adult to complete the following questions on behalf of their group. The answers should represent the agreed view of the group.

- Date of visit (so this can be matched to the activity type in the metrics template).
- Activity name.
- Was the activity
  - Online?
  - In-person?
- Number of adults
- Number of children
- Age(s) of children

Following the event/activity/visit:	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
We enjoyed taking part in the activity.					



We are more interested in climate and environmental sciences.					
We can see a connection between climate and environmental sciences and our own lives.					
We are more likely to read or watch items about climate and environmental sciences.					
We are more likely to talk each other or to friends about climate and environmental sciences.					

- How do you think climate and environmental science plays a part in your everyday life?
- Following today's activities on climate and environmental sciences, is there anything you will do differently in your own life?
- What was your favourite part of the activity and why?
- What motivated you to join today's activity?
- Any other comments?

### *Staff reflections*

We recommend using the following tool when the activities are short interactions and busking-type activities, either in the centre or out in the community. If you could aim for at least one staff member to complete this following the activity that would be appreciated.

1. Date of activity.
2. What happened during the session you are reflecting on? Include a description of your role, the activities on offer and how you interacted with audience.
3. Thinking about the session, were there any aspects which were particularly popular or stood out to you? For example, this could include specific exhibits or activities or question topics.
4. What were the main areas of interest visitors had in relation to environmental and climate science?
5. In relation to the Operation Earth project vision to engage, inspire and involve families with environmental and climate science, do you think this has been achieved in this session? Please explain.
6. Are there any actions you will take as a result of your experiences? This could be personally or more widely within your organisation.
7. Following your experiences is there anything you will do differently? Is there an action you will personally take now or in the future?

An online form is available for you to use. The responses will be collated by Ondata. Staff completing the form will have the option to e-mail a copy of the responses or you can request a copy of the forms for your organisation.

Staff reflection form: <https://forms.office.com/r/E7Ny9AYcj1>

### *Researcher reflections*

If you are working with researchers to deliver the activities we would appreciate it if you could ask them to consider the following questions on their experiences.

1. Please describe your area of research or job role.
2. Have you previously worked with science centres or museums?
3. Date of activity.
4. Name of activity.
5. What motivated you to get involved with this session? Has the experience met your expectations?
6. What happened during the session you are reflecting on? Include a description of your role, the activities on offer and how you interacted with audience.
7. Thinking about the sessions, what parts stand out to you? Why?
8. Has this experience helped to further develop your confidence, knowledge and skills? If so, how?
9. Following your experiences in the activity, are there any actions you will take as a result? Has the experience resulted in any changes in practice in your work?

As above, an online form is available for you to use. The responses will be collated by Ondata. Staff completing the form will have the option to e-mail a copy of the responses or you can request a copy of the forms for your organisation.

Researcher reflection form: <https://forms.office.com/r/aF1NtQj1yL>

### *Immediate actions*

In terms of actions required at this stage, please write to the Operation Earth Project Manager Cait Campbell with responses to the following queries:

1. Confirm that you are able to use the surveys questions provided at the Operation Earth activities. If not, please let Cait know and we'll be in touch to discuss.
2. Send copies of the survey form you will be using for our records.
3. Let us know if there is any additional evaluation data you will be able to provide. For example, any staff reflections or observations or any other survey or feedback methods.

If you have any questions please let Cait know and she can pass on your query. We are here to support you in evaluating the activities so please let us know if you need any advice or guidance.

Appendix 4. Evaluation Metrics Table

1. Name of centre	2. Date of activity	3. Project	4. Activity type	5. Short description of event/activity	6. How does the activity/event fit within the project?	7. Please provide further comment on how the activity links to the aims of the project	8. Number of people reached	9. Audience type	10. Length of activity	11. Involvement of researchers?	12. If yes, how?	13. Any other audience insights available? E.g. proportion of audience from 20% most deprived areas or proportion of first time visitors.