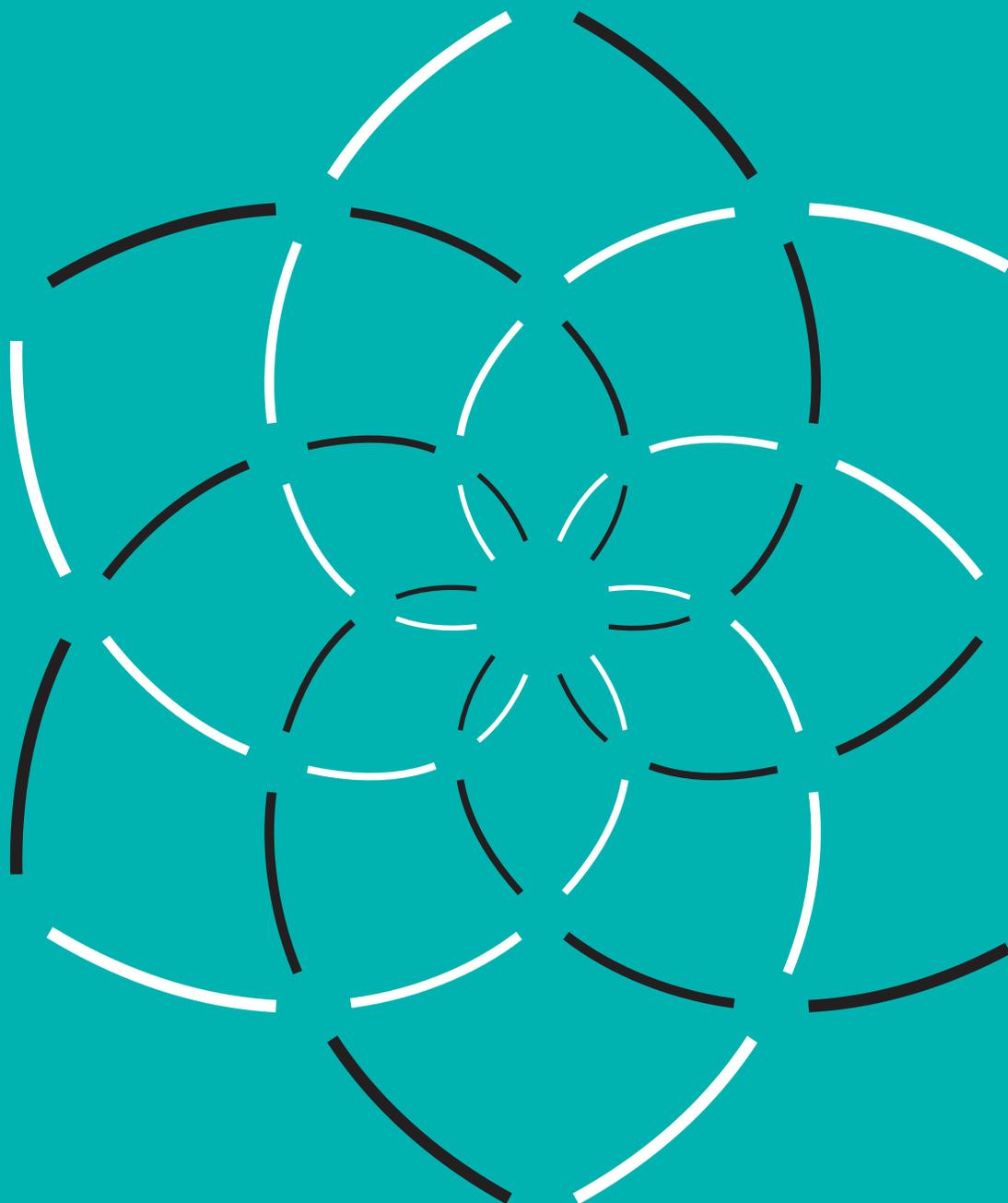


Engaging Environments

Compiled final reports



National
Co-ordinating
Centre for
Public Engagement



Introduction

Between October 2017 and October 2018 the Engaging Environments Programme sought to develop consortia of partners, working together to engage the UK public with environmental science. Funded by the Natural Environment Research Council (NERC), the project aimed to realise more effective approaches to public engagement, moving beyond standard dissemination methods, to co-creating engagement with communities, artists, and publics.

Phase 1 saw five innovative and ambitious projects funded to pilot these new approaches, whilst the National Co-ordinating Centre for Public Engagement (NCCPE) sought to add value as a coordinating 'Hub'. This role maximised the impact of Engaging Environments, ensuring that the programme activity was intelligently aligned, the learning consolidated, and that stakeholders were effectively engaged. As part of this coordination function, the Engaging Environments Hub has collated the final reports from each of the funded projects, to give an overview of the achievements and learning across the whole programme.

This report includes summaries of each project and headlines from the learning of each, contributing valuable knowledge to both NERC and the wider sector. Also covered in this report are reflections on the process and how it has affected the approach to Phase 2, which gave the funded projects the opportunity to scale up their pilot approaches and bid for three year's worth of funding to carry out their work at a national level.

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Climate Stories

Climate Stories was led by the University of Exeter and involved freelance artists and musicians and researchers from the Maths (Peter Stott, PI), English (Sally Flint), Drama (Evelyn O'Malley) and Geography departments (Stewart Barr, Ewan Woodley) of Exeter University as well as Chris Rapley from UCL. It included investigators from the Met Office (Peter Stott, PI, Rosie Eade), from Double Elephant Print Workshop in Exeter (Fiona Lovell), from Weather, Art and Music (Pierrette Thomet, WAM; project co-lead) and from the Royal Meteorological Society (Cat Muller). Climate Stories was also supported in its efforts by the Institute of Physics (Miranda Addey) and the Met Office (Felicity Liggins) as partner organisations and involved freelance musician Dan Plews and filmmaker Josh Gaunt.

Climate Stories invited climate scientists to participate in this Devon based initiative. Twenty volunteer climate scientists from the University of Exeter and the Met Office were accepted on to the Climate Stories programme.

Summary: Climate Stories aimed to break down current communication barriers between climate scientists and the wider public by engaging the professional communication skills of arts practitioners from a range of disciplines. This has enabled the public, artists and scientists to co-develop new creative approaches to dealing with environmental change, one based on an innovative method of engagement through shared projects. Climate Stories has produced an archive of materials including a book, online resources including films and a podcast, and conference presentations. Work is on-going to finalise the evaluation of participants' experiences and to publish the findings in peer-reviewed publications.

To what extent has your project delivered against its aims?

Climate Stories achieved all four of its objectives.

- We enhanced the communication skills of a cohort of climate scientists, who thanks to their engagement with the arts, are now bringing new ways for communicating their science to a wider public. For example, participants have read their poetry during presentations at academic conferences and artistic materials developed in Climate Stories have been included in a presentation at the Climateurope Festival on Climate Services in Belgrade in October 2018.
- We worked with a diverse range of community groups over the course of the project and demonstrated how by working together on common arts-based projects, barriers between “experts” and “publics” are broken down, allowing new understandings to develop by participants from all sides.
- We provided a legacy of curated materials including a published book of writing and online resources for information and debate and archived materials including recordings, films and animations. We have also contributed to the ongoing debate about the communication of science through presentations at international conferences and preparation of materials for submission to peer-reviewed publications.
- We have analysed and evaluated the progress of this engagement through a series of structured interviews and the analysis of participants' logbooks. This information will help inform future initiatives to develop further the capability for the public, artists and scientists to co-develop new creative approaches to dealing with environmental change.

ENCOMPASS

Organisations and partners:

The University of Birmingham (including the Lapworth Museum of Geology, Birmingham Institute for Forest Research, Centre for Ethnic and Minority Entrepreneurship)
Citizens UK (including member organisations of the Birmingham Chapter)
Earthwatch Institute
Bewdley School and Sixth Form Centre

Friends of Riverside North Park, Bewdley
Wyre Forest District Council
Handsworth Wood Girls' Academy
St Francis RC Primary School

Other friends and supporters:

Cannon Hill Park Friends
Apsire and Succeed
Lozells Methodist Church & Community Centre
Birmingham Methodist Circuit

Highbury Park Friends
Chamberlain and Highbury Trust
Birmingham and Black Country Wildlife Trust
Birmingham City Council (Rangers Service)
Community Partnership for Selly Oak
Guild of Students (UoB)
Oxford Museum of Natural History
Environment Agency

Summary: ENCOMPASS examined the practice of community organising with special reference to how environmental science research can be aligned with the concerns of communities' contemporary (environmental) issues. Our aim was to work toward a way to share the research agenda with the communities by helping to establish its relevance to them.

To what extent has your project delivered against its aims?

Our initial aim was set with a view to building toward stage 2 and achieving this aim through a larger scale and longer time frame project. Our stage 1 specific objectives were to develop a tool kit or framework for adapting community organizing to environmental science engagement. We envisaged a strong focus on community engagement as key. Our vision was not misguided but we very quickly realized that community organizing is more a set of principles and a practice. A framework is too rigid in this context and in any case is provided by organisations like the NCCPE for community centered engagement. We therefore used strategic /targeted listening around environmental science rather than fully open ended listening commonly used in community organising. This set of principles, we have found, is more infectious and more easily picked up as a concept than a directed set instructions as part of a framework. Our training instils this aspect and it reflects current thinking behind citizen science and differing levels or participation.

Opening up Science for all

Leadership team organisations: University of Reading (Lead), UCL , Imperial College, University of Salford, Newcastle University, Earthwatch Europe

Project partner organisations (contributing staff time):

NERC Centre for Hydrology and Ecology, Open University, Open Air Laboratories (OPAL), NERC British, Geological Survey, Royal Horticultural Society, UK Environmental Observation Framework, National Co-ordinating Centre for Public Engagement, Museum of English Rural Life, UK Association for Science and, Discovery Centres, Joint Nature Conservation Committee, Department for Environment, Food & Rural Affairs

Summary: To open up environmental science for all, through the course of Stage-1, the team adopted a CoP approach. This is defined as “a group of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger-Trayner 2017). Four CoPs were established around the UK, in Reading, Greater Manchester, Newcastle and London. Each took a slightly different approach and each CoP shared learning locally and with each other as they went along through a mix of face-to-face events and online sessions. Running alongside these local activities was an open access training programme to build capacity within and beyond the NERC research community around citizen science practice. The work of the local CoPs and the citizen science training was complemented by a national survey and face-to-face meetings to broaden input beyond the CoPs and a blog to examine the existing and potential barriers and opportunities facing a national CoP. The four self-sustaining local CoPs and the emerging national CoP are exemplars of how increased commitment to public engagement can be achieved through collective learning, capacity building initiatives, and shared resources. Our project was informed at all stages by a robust approach to evaluation to tell us what was working, what wasn't and to inform project needs.

To what extent has your project delivered against its aims?

In order to fulfil our aims, the *Opening up science for all* project team listened to and worked with the NERC research community, community groups, policymakers, practitioners and cultural and environmental partners to build capacity and nurture a consortium and an extensive network to create a shared vision for public engagement with environmental science in the UK. We did so by implementing and evaluating the following activities:

1. bringing together multi-disciplinary researchers, practitioners, public-facing organisations and communities from across the UK to co-create a shared vision for a national CoP through face-to-face events and online survey, and a blog that unlocked community assets and enhanced collective learning;
2. building the capacity of UK environmental research community and beyond by mobilising and catalysing local stakeholders through local CoPs at four UK sites to expand current activity, generate local knowledge and share learning;
3. developing and implementing a training module focussing on deep and broad public engagement with the scientific process through citizen science, thereby extending the capacity of environment-related researchers and others in the UK.

The Climate Communication Project

Project team: Priestley International Centre for Climate, National Centre for Atmospheric Science, Climate Outreach, Royal Meteorological Society, Manchester Metropolitan University, Cardiff University, 10:10, National Centre for Earth Observation, British Antarctic Survey.

Project partners: Grantham Institute, Tyndall Centre, University College London, University of Surrey, Refugee Action, Manchester Climate Change Agency, Bristol Avonmouth Community Centre, Disability Stockport, Manchester Faith Groups, University of Exeter, Climate Coalition, Royal Horticultural Society.

Summary: Over the last decade, the level of interest in climate change communication has grown rapidly – there’s now a huge number of people, organisations and institutions involved in the theory and practice of public engagement. Many practitioners used to take it for granted that their approach to public engagement was the right one, but the importance of connecting with the evidence base on communication is now widely acknowledged. The evolving social science of communicating climate change is just as important as the climate science that tells us what the problem is in the first place.

The Climate Communication Project brought together leading academics and practitioners working on public engagement with climate change to evaluate the climate communication knowledge base. Through an ‘audit’ of UK capacity and expertise on climate change communication, a synthesis of key research findings, and by listening to a range of community groups’ views and needs, we aimed to put in place the infrastructure to deliver high impact public engagement on climate change at a national scale.

To what extent has your project delivered against its aims?

The three stated aims of the Climate Communication Project were:

- 1. Carry out an audit of public engagement capacity and capability, among the existing diverse pool of expertise within the UK;*
- 2. Use co-production methods to work with diverse representatives of UK publics to establish opportunities for impactful public engagement;*
- 3. Synthesise existing literature and best practice on public engagement and share with public engagement practitioners and environmental science researchers.*

We have achieved all three of these aims. For (1), The Climate Communication Project produced a report that, for the first time, canvassed public engagement and communication practitioners on their views about climate communication (through a survey and expert elicitation workshop) and identified recommendations for best practice and areas of agreement and disagreement. For (2), we successfully conducted three co-production community workshops with three diverse and underserved community groups, providing a better understanding of their ‘need’ and preferences around climate change communication (findings published in an open access journal). And on (3), we produced a series of summary blog-posts, published on the Climate Communication Project website, which capture key conclusions on important climate-oriented public engagement themes.

Future of our Seas

The Future of Our Seas (FOOS) project brought together nine major UK marine research, engagement, advocacy and environmental arts organisations (the Marine Biological Association, King’s College London, Joint Nature Conservation Committee, Sir Alister Hardy Foundation for Ocean Science, University of Plymouth Marine Institute, University of Edinburgh, Scottish Association of Marine Science, Incredible Oceans and Invisible Dust).

By combining scientists, facilitators, creatives and science communicators, Future of Our Seas aimed to equip marine researchers with capacity and skills to engage people in vibrant, two-way conversations about the future of our seas.

Summary: The project consisted of two “interventions” which offered marine scientists the opportunity to take part in an in-depth public engagement training, mentoring and practice programme. The first intervention took place in April and May 2018 in Plymouth, culminating in a two-day public engagement event as part of Plymouth Pirate Weekend. The second intervention happened in June and July 2018 in Oban, leading to a two-day public event during West Highland Yachting Week. Special attention given to evaluation and learning during and after the interventions allowed the team to make continuous improvements and establish a repeatable consortium-building blueprint for engaging the public with environmental science. This blueprint has been incorporated into an application for Stage 2 of NERC Engaging Environments, which includes the FOOS team and partners from other Stage 1 consortia.

To what extent has your project delivered against its aims?

- 1. Build a diverse and interdisciplinary collaboration** with a shared understanding and capacity for action. This was achieved through a comprehensive capacity-building training co-designed by the project team and delivered to both the team itself, as well as 2 groups of early-career marine researchers.
- 2. Enable early career researchers to engage with local community groups to co-create engagement activities** designed not only to inspire the public and future researchers, but also to develop a two-way dialogue around NERC’s marine research. Using learnings from the training, participants partnered with community groups and creatives to design engaging and innovative outreach activities that make their research relevant to people’s lives. During the activity development period, they were also supported with a mentoring programme by public engagement specialists. To test this proof of concept and fulfil NERC criteria, pop-up domes were taken to two regional public free-to-enter events with non-self-selecting audiences: Plymouth Pirates Weekend; and Oban West Highland Yachting Weekend.
- 3. Create a ‘megaphone effect’,** generating impact through media engagement. This worked particularly well for the public event in Oban, with interviews on BBC Scotland Radio, BBC Alba TV, and an article in the local newspaper, the Oban Times .
- 4. Review and assess the intervention** Over the course of the project, we built in steps of impact evaluation and reflection on our processes, allowing the team and FOOS participants to make improvements and adjustments at every stage of the project: during activity development; between days 1 and 2 in the public events; and between the Plymouth and Oban interventions. A final project evaluation took place in September 2018.
- 5. Develop a blueprint** – a tried-and-tested toolkit for consortium building and making a splash in environmental public engagement; setting the foundations for national-level action. The blueprint will be further explained in the Research for All paper of the project team. It has also been incorporated in a Stage 2 Engaging Environments application.

Engaging Environments Hub

The NERC Engaging Environments call offered an important opportunity to scale up and enhance the quality of public engagement with environmental science. With five other innovative and ambitious projects funded, NCCPE sought to add value as a coordinating 'hub'. This role maximised the impact of Engaging Environments, ensuring that the programme activity was intelligently aligned, the learning consolidated, and that stakeholders were effectively engaged. Our aim was to lay the foundations for long term, effective and innovative public engagement with environmental science

To what extent has your project delivered against its aims?

Objective 1: Building partnerships to underpin the second stage of the project

Throughout the course of the project, the Engaging Environments Hub hosted four meetings that brought the project teams together to network, share learning and collaborate. These meetings helped strengthen the partnerships across the funded projects as well as develop a suite of shared tools and resources such as a shared logic model and evaluation questions. This built a sense of common purpose, with clarity about the distinctive contribution that environmental scientists can make to effective engagement of the public in environmental issues.

Working collaboratively with the funded projects and external partners, we also curated and produced two external events. The Engaging Environments Symposium was a day-long event bringing stakeholders together to explore the challenges around engaging the public with environmental science and helping to direct future approaches. We also worked closely with The Natural History Consortium to curate a session at their environmental communication conference, Communicate. In addition, we opened up one of the project meetings – The Open House meeting – for external stakeholders, offering the opportunity to find out about the projects.

Objective 2: Building capacities and stimulating innovation by:

A shared 'theory of change' to articulate the assumptions, rationale and evidence base underpinning the various interventions being pursued by the projects was developed at the Kick-off meeting. This framework was tested at project meetings to consolidate the learning from across the project, & maximise the potential to develop effective interventions & approaches. This culminated in the process of creating the shared resource.

Not only did the shared resource deepen understanding and evidence of 'what works' in terms of public engagement practice, but the Engaging Environments Hub also commissioned a piece of research looking at the NERC research community and its public engagement needs. This consultation aimed to elicit information about the baseline public engagement landscape within the community, including drivers and barriers, strengths and weaknesses as well as to identify targeted and effective opportunities for the Engaging Environments programme to mobilise the community to deliver effective, national-scale public engagement with contemporary issues of environmental science.

Throughout the project, the Engaging Environments Hub has been helping to maximise the impact of the various engagement activities being undertaken through various channels. The main Engaging Environments page on the NCCPE website has had 809 page views since it was created in Jan 2018. The public events such as the Open House Meeting and Symposium were also widely publicised on the NCCPE website, newsletter, mailing list and on all social media channels. These events themselves also created awareness of the programme throughout a wide audience of stakeholders and public engagement professionals.

Finally, the Engaging Environments Hub is ensuring a lasting, accessible legacy of resources and evidence to inform future practice through hosting the [Engaging Environments booklet](#) permanently on the NCCPE website, as well as publishing printed copies to distribute widely through our networks. The NERC research community report will also be published as a tool for both NERC and the wider community.

How does the project fulfil NERC's objectives of building capacity and consortia?

Climate Stories: The project has demonstrated that working across disciplinary boundaries by bringing together practitioners in the arts, the social sciences and the physical sciences together has huge potential to develop new narratives about environmental change. It has shown that there the national learned societies including the Institute of Physics and the Royal Meteorological Society share common interests with NERC and the Met Office in developing improved strategies for engagement with a range of publics about the challenges of environmental change.

The principal capacity that **ENCOMPASS** has built is in community organising practice and in particular developing this practice as a way to broker and design effective engagement with environmental science. This capacity building phase has provided an opportunity to learn about the practice. Stage 2 now presents the opportunity to put it into practice on a national scale.

The partnerships established by ENCOMPASS with Citizens UK is important. The already strong link to social science research has now extended and branched into environmental science. With this comes several groups including faith groups, schools and community groups that have been active participant or critical friends. Several ENCOMPASS projects remain live and will be ongoing of their own accord and supported by a NERC Innovation Placement Fellowship (NE/S009396/1).

ENCOMPASS shared a partnership with Earthwatch Institute with the OPENER project. This commonality in citizen science expertise has allowed ENCONPASS and OPENER to share the key strengths of each project and identify a significant synergy and aligned aims which have fed into a combined stage 2 proposal.

The Climate Communication Project itself brought together a significant consortium (within the project team and the wider network of our project partners and advisory group), including environmental/climate science academics, social scientists, and communication practitioners. One tangible outcome of this partnership is the development of a bid (Time To Engage) for Phase 2 of the Engaging Environments programme.

Through the expert elicitation workshop and the online survey, we were able to engage - virtually and in person - several hundred climate communication practitioners who provided often detailed views and opinions on best practice in climate communication. This has never been done before and represents a significant capacity-building exercise for the climate communication community.

The Climate Communication Project produced a benchmarking report on the current state of UK engagement with climate change (based on the view of public engagement practitioners), and recommendations for how to conduct public engagement based on best available evidence. This will enhance the capacity of researchers and practitioners nationwide.

Engaging Environments Hub: At each stage of the project, the Engaging Environments Hub has facilitated partnership building between both the funded projects and the wider community. As a result of this, three out of the four bids for phase 2 funding were consortia of funded projects who had been enabled by the Engaging Environments Hub to explore ideas and develop shared ideas.

How does the project fulfil NERC's objectives of building capacity and consortia? (cont'd)

Opening up science for all strengthened capacity within the environmental science research community and beyond through the delivery of interactive activities to fill the capacity gaps:

- i. **Website and blog (available beyond the lifetime of Stage-1):** development and circulation of an online resource library dedicated to public engagement and citizen science resources.
- ii. **Online training course (available beyond the lifetime of Stage-1):** Development and provision of a Masters-level online MOOC and face-to-face course about citizen science and crowdsourcing, as well as developing a shorter online course aimed at practitioners about citizen science
- iii. **Local CoPs (now self-sustaining):** co-creation of four CoPs with local stakeholders (researchers, support staff and community participants) to ensure relevance to CoP participants.
- iv. **National CoP workshop:** bringing together a wide range of stakeholders who participated and shared their visions for public engagement.
- v. **Project team:** development and consolidation of capacity to lead and deliver effective national-scale public engagement through the establishment of collaborations and partnerships.

The *Opening up science for all* consortium was built on mutual respect and trust from the beginning through collective vision and values sharing at the initial project meeting, and further enhanced through knowledge-sharing and discussions at regular calls, mid-term and end meetings. Beyond *the project*, the team led an effective, national-scale consultation with project partner organisations and many other stakeholder groups working on the interface between environmental science and the public, to scope out a national CoP for public engagement with environmental science.

Future of Our Seas: NERC sought consortia that worked in a reflective and responsive manner; open-minded to sharing, learning, and with a flexible approach to future opportunities. Over the duration of the project, Future of Our Seas worked to create an environment in which all participants held a shared vision and purpose, and so were able to support each other in learning about public engagement, discuss ideas freely, and provide constructive critiques of individual activities and the programme as a whole. This was reflected in our final project meeting, where early career researchers were invited to attend and participate in reviewing and reflecting upon the project. Eight chose to engage in this final 2-day meeting and offered candid and honest reflections on the programme. These, as well as the consortium members' reflections have been incorporated into a further bid in Stage 2 of the Engaging Environments programme.

NERC sought to foster the conditions where environmental science research, and NERC Public Engagement, is known about, trusted, utilised, and valued. Both engagements undertaken sought to take sometimes complex science and relate it to a wider audience. In Plymouth in particular two engagements linked to ocean plastic resonated with a public that has begun to see the scale of the impact and value of science in the area.

NERC sought cultural and structural changes in the environmental research community. We believe that the way that we (the consortium) would approach public engagement in the future has absolutely changed. The importance of shared values across a multidisciplinary consortium is paramount - it enabled us to create a shared vision first for ourselves, and then with the ECRs, and in Oban, with the community groups, leading to successful, engaging events. The structural change relates to the phase 2 proposal.

How has the first phase of Engaging Environments affected the approach to phase 2 and beyond? To what extent is this two-phase model helpful in developing partnerships; in sharing learning; in creating effective bids for phase 2?

ENCOMPASS has been able to develop practice in community organising that has been important for informing the design of work packages in the related stage 2 proposal. Important lessons about the principles of organising have been used to de-risk our approach in stage 2 with appropriate timing, volunteer strategy and knowledge about existing listening and environmental issues in different areas within the UK from colleagues in Citizens UK and academic partners.

The Engaging Environments Hub has enabled a partnership between OPENER and ENCOMPASS to be identified and subsequently developed in a stage 2 proposal.

Funding for stage 1 did not multiply to cover all stage 1 partners in a stage 2 bid. Ultimately this critically undermined the EE Hub and resulted in a split and potentially burnt some bridges which is regrettable.

Some understanding of each project was facilitated by EE Hub, but sharing of learning was not a major benefit in the end. Each project focused on building the capacity they set out to build and although a genuine effort was made to find a collaborative model, the available funding for stage 2 simply precluded any meaningful sharing with potential competitors.

The Climate Communication Project: Phase 1 has provided a strong framework for designing the public engagement activities we are proposing in *Time To Engage* in Phase 2. The guidance the Climate Communication Project provides (through our report and summary blog-posts) provide evidence-based and 'consensus based' guidance for creating impactful public engagement in Phase 2.

The first phase enabled a relationship-building process amongst the Climate Communication Project team, and gave partners a better idea of the roles and responsibilities for a second-stage project, building trust among our wider network that we are the right group of people to design and deliver effective public engagement in Phase 2.

Future of Our Seas: This two-phase model is helpful in developing partnerships; in sharing learning; in creating effective bids for Stage 2 - it has been an important learning step prior to a Stage 2 bid being submitted from members of FOOS, NCCPE and individuals from Opener and Climate Communication Project together with new partners from multiple institutions. Without the learnings from Stage 1, a significantly expanded bid would have been untested, and associated with greater risk.

Engaging Environments Hub: Offering funding to support consortia building in phase 1 is really important. All too often, collaborators come together to bid for funding, without having the time to consolidate their partnerships, roles, and responsibilities. Inevitably this can lead to partners being disadvantaged by the bidding process. Having funding devoted to developing partnerships so that they can work together to develop an approach has worked really well for developing high quality equitable approaches to engagement.

How has the first phase of Engaging Environments affected the approach to phase 2 and beyond? To what extent is this two-phase model helpful in developing partnerships; in sharing learning; in creating effective bids for phase 2? (cont'd)

OPENER: iScoping out phase 2: For Opening up science for all, the first phase of Engaging Environments enabled us to scope out a national CoP around which to build an “ambitious, large-scale” project “with clear intent to achieve national profile and recognition for engaging the UK public with contemporary issues of environmental science.” We brought together and listened to the project team, existing project partners, potential partners and members of the emerging national CoP, as well as convened and learnt from local CoPs in Reading, Greater Manchester, Newcastle and London.

iShared learning: In order to build capacity, we scoped out and published an online training course for environmental citizen science, as well as developed a set of resources and informative blog posts in/around public engagement with environmental research and citizen science. We used an online survey, podcasts and a national meeting to share opportunities and barriers facing the sector, existing knowledge and ideas in development, as well as horizon-scanning and advocacy.

Interaction: Opening up science for all created spaces for online and face-to-face interaction for the wider NERC research community around public engagement with environmental science and citizen science. These events and resources were accessible to all other Stage-1 projects and we used this time (including activities organised by the Engaging Environments Hub and ENCOMPASS) to build capacity and explore options for consortia.

Evaluation: Lessons learned from Stage-1, including key ingredients for building effective communities of practice (see Figure 1) and other valuable lessons (<https://research.reading.ac.uk/openupsci/2018/10/29/key-lessons-and-areas-for-development>), have been vital for informing and ensuring a solid and impactful Stage-2 proposal.

The two-stage process has in many ways been helpful and formative for sharing learning and developing a stronger consortium for Stage-2.

It enabled our project team to:

Develop partnerships: Work with existing and new project partners identified as part of our Stage-1 activities through time and resources for an online survey, and face-to-face workshops;

Share learning: Benefit from meetings as part of and beyond our Stage-1 project to build relationships and identify strengths and commonalities, as well as challenges and potential risks;

Create effective bids for phase 2: From the opportunities to share learning across the Engaging Environments, it enabled us to initiate a strong partnership with ENCOMPASS with whom we share a project partner: Earthwatch.

However, the two-phase model does present some challenges and risks:

Short-term funding: With Stage-1 being only one year with no guarantee of continuation, expectations around partnerships and continued sharing of learning need to be carefully managed to retain enthusiasm and connections between Stage-1 and a possible Stage-2 project;

Completion dates: The Stage-2 call was launched and closed before the Stage-1 projects had reported, as a result there was an overlap between bid-writing and project completion. A risk here relates to not all shared learning being available, or if available full oversight not accessible to all Stage-1 projects, thereby increasing competition. Although it is important to acknowledge that competition may be desirable in the pursuit of excellence and innovation.

How has the community broadened beyond the initially funded projects? How have non-funded projects been involved in appropriate ways?

The Climate Communication Project: We responded to new opportunities throughout the project, including collaborating with non-funded project partners to increase the reach and effectiveness of our work. One example is the co-production of *How (Not) to Talk about Climate Change*, a short video sketch produced with YouTuber Climate Adam for Green Great Britain week. We saw this as a chance to broaden our project by incorporating new ways of disseminating our findings, and we achieved over 15,000 video views. Over 10 partners outside the project team helped contribute to our vision by writing or editing our evidence review blog posts - and a further 14 attended, giving their time 'in kind', the expert elicitation workshop.

Climate Stories has contributed to other activities and festivals including the Sidmouth Science Festival in October, 2018 and the IoP Festival of Physics in Exeter in December, 2018. It was part of the University of Exeter Culture and Arts Strategy launch in October, 2018.

- Climate Stories was included in the UK's second national adaptation programme for climate change for 2018-2023. In a report that sets out what the government and others will be doing over the next 5 years to be ready for the challenges of climate change, the Climate Stories project is included as an example of raising awareness and promoting action by improving public engagement on climate change. <https://www.gov.uk/government/publications/climate-change-second-national-adaptation-programme-2018-to-2023>
- The Climate Stories project was featured in the Physics World publication, and also the Physics World podcast of November, 2018 <https://physicsworld.com/a/getting-engaged-what-encourages-the-public-to-marry-up-with-environmental-research/>

At the national scale, the **Opening up science for all** project embraced an inclusive approach to scoping out a national CoP for public engagement with environmental research. Activities underpinning this approach included an online survey distributed widely through contacts, mailing lists and social media, as well as a joint workshop with UKEOF "Maximising the benefits from Citizen Science for monitoring the environment", a project partner meeting with supporting organisations to facilitate active participation, and the national CoP workshop in Birmingham 2018 described above. Non-funded projects and participants in the early NERC Community Consultation (prior to Stage-1) were invited to participate in the face-to-face meetings and workshops. Knowledge of the *Opening up science for all* project and involvement in the scoping out of a CoP was further enhanced through participation in Engaging Environments presentations organised through Engaging Environments Hub, including the mid-term May meeting, and the October Engaging Environments Symposium and Communicate conference presentation. Additionally, *Opening up science for all* consortium members presented the project at national and international conferences, including at the European Citizen Science Association conference, the UCL Policy Citizen Science Roundtable, Coastal Futures meeting, European Ocean Observing System conference, further initiating new conversations with interested members of a future CoP.

How has the community broadened beyond the initially funded projects? How have non-funded projects been involved in appropriate ways? (cont'd)

Engaging Environments Hub: Throughout the programme, the Engaging Environments Hub has sought to bring together the wider community and engage them with the work of the project. As a result of our public events, 146 representatives from over 99 external organisations have been involved in the project.

- Symposium: 86 delegates from 62 external organisations
- Open meeting, 2nd May: 12 delegates from 9 external organisations
- Communicate conference overall: 154 delegates from 91 organisations (48 delegates in the Engaging Environments session from 28 organisations)

ENCOMPASS The partner list at the start of this report contains additional partners that have come on board as a result of initial network building with CUK and through Listening practice.

- ENCOMPASS joining with OPENER has provided combined access to wider networks.
- The joint influence of ENCOMPASS and OPENER teams has facilitated a long list of stage II partners including partners who approached us, e.g. Primary Science Teaching Trust, The Future Melting Pot.
- New partners brought into stage II through ENCOMPASS include UNESCO UK Geoparks Commission, The University of Plymouth Sustainable Earth Institute and the Science in University Museums Group.

What has your project found out about quality engagement in environmental science?

Climate Stories: What we've found so far:

- Creative life histories and familiarity matter. Participants intimately connected their previous, and frequently childhood, experience of creativity to help them bring their science to life through creative practice;
- Connections to nature through upbringing and research: participants often cited their upbringing and the way in which they learn about nature and the environment as being a motivator to help others appreciate and engage in the science of climate change. Having this 'nature legacy' in learning enabled participants to centre their approach to creative practice;
- Observational practices: participants were keen to link their own science, in a range of fields, to what they could observe and highlight to others in accessible and familiar ways. This was key to scientific participants being able to connect their research with publics;
- Vocational 'calling': participants expressed a deeply personal desire to bring 'wonder' to others and to help them engage in this emotion as a way of connecting them with climate science and the impact of climate change;
- An unproblematic 'researcher-artist' identity: participants were highly capable of negotiating their identity as both a natural scientist and a creative practitioner. The comfortable and inclusive setting of Dartington certainly supported this;
- A concern about the artistic 'echo chamber': alongside feeling confident as scientists and creators, participants did feel challenged by only being surrounded by those with similar backgrounds and experiences, leading them to question how others could be engaged in these processes in the future;
- An anxiety about 'being received': Dartington provided a very 'safe' and inclusive space, but participants did discuss how they would cope once their work was 'put' into different contexts, amongst various publics.
- An anxiety about 'having answers': participants were aware and somewhat anxious about their perceived role as 'experts' in community settings, where they would potentially be questioned about climate science and be expected to 'have answers'.

What has your project found out about quality engagement in environmental science? (cont'd)

The Climate Communication Project: We found that by benchmarking the state of public engagement in the UK, we could provide better resources for the community, which directly responded to the challenges and points of interest raised by other communication practitioners. The high response to our audit survey and interest in our findings clearly shows there is a need for this kind of assessment process and evidence-based approach.

We learned that using a process of expert elicitation modelled on the International Panel for Climate Change was an effective way to find out the level of agreement behind what works, and what doesn't work for climate change engagement.

We found that a well-planned, thorough and evidence-based report on best practices in public engagement is a useful resource for researchers and practitioners, and will be used by members of the environmental science research and public engagement practitioner communities to support future engagement activities. We found that a community-level approach is an essential counterpart to any larger-scale plans to communicate climate change at a national level. A one-size-fits-all solution will not work.

There is a lot of enthusiasm and support for the process of benchmarking and reviewing the practice of public engagement with climate change.

OPENER: The quality of a project is about capturing change. Capturing change in the life of the people involved in a project requires detailed, in-depth, and holistic descriptions that represent people - in their own terms. In *Opening up science for all*, quality of engagement was about understanding what people value and the meanings that they attach to their experiences in our activities from their own personal, organisational, and cultural perspectives. To capture the descriptions of these experiences we designed interview guides and carried out interviews with the *Opening up science for all* team, facilitators and participants from our CoP events, and participants from our MOOC.

The highlights of what we learned from our project team about quality engagement are that:

- there is a strong appetite for dedicated spaces for facilitated exchange, learning, and networking;
- communities of practice provide spaces and circumstances to promote and nurture capacity to open up science - they bring strong added value to research communities;
- the creation of these spaces and circumstances is catalyzed by motivated engagers whose attitude enthuses participants;
- the creation of these spaces is also an act of co-creation which requires flexibility, receptiveness, and responsiveness - that is, engagement cannot be prescriptive, each community is unique, and unfolds at different speeds;
- engagers need to feel supported - by their organisations (culturally and financially) and colleagues which also give sustainability to CoPs;
- quality of engagement is about recognising, sharing, and celebrating the rich variety of practice and mandates but it is equally important to foster dialogue and capturing of tensions and differences;
- quality of engagement is also about listening to individual CoP participants, recognising their stories and collaboratively expanding and integrating relevant stories in CoP practice and local environmental research;
- exchanges between different CoP leads/engagers are essential to benchmark, exchange and enrich practice, and build capacity for continuous learning.

From participants we learned that quality engagement is about creating arenas as safe spaces to be exposed to different perspectives and approaches to public engagement in environmental research, gain new insights on opportunities and resources available for engagement, meet, connect with, and learn from other individuals within and from outside their organisations about the type of engagement work they are doing.

What has your project found out about quality engagement in environmental science? (cont'd)

Future of our Seas: The FOOS project trialled new and innovative methodologies for engagement moving away from some of the traditional top down approach of much science engagement. By looking at the science in new ways and working with community groups the consortium and ECRs learnt new techniques. Some of the lessons learnt and recommendations for future work are discussed below:

- Time pressure. Although perhaps obvious, through Future of Our Seas, nearly everyone involved has commented on the amount of time and resources required to produce public engagement interventions which engage deeply. Nearly all of the project consortium committed many more hours than anticipated to the project, designing and assessing the programme and mentoring early career researchers. The researchers themselves were also surprised by the amount of time, resource, and commitment involved, and not all of them were able to engage fully, although those who did engage fully found the process incredibly rewarding
- Recognising preparation. Supporting effective consortium building is important – the preparatory work for successful engagement is as important as the engagement itself, but is not often as well funded. This is particularly true for geographically scattered teams and projects where meeting, travel and online communication costs can be significant.
- Funding Models. The process proved complex especially for third sector and public engagement specialists. In particular reference to 'Costs for business, third sector or government body' Co-Investigators must not exceed 30 per cent of the full 100 per cent FEC cost of the grant' was difficult to manage.
- Supporting community involvement. Engaging community groups and local organisations is of great value but needs a proper allocation of time and monetary budget in order that they are able to participate fully.
- Public perception. We uncovered a large public appetite for new approaches to public engagement around environmental science, in particular for reaching out to non self-selecting audiences and meeting them at locations and events where they did not anticipate encountering it.
- Gender and public engagement. Our project attracted a disproportionately high percentage of female trainees and there should be an awareness that public engagement work can often attract female participants but is perceived by some to be injurious to their science careers, with male colleagues appearing to be engaged in more serious and focused research.
- Local events have substantial impact. In Oban there was anecdotal evidence of secondary learning from the event, where members of the public attended and shared what they learned with family and friends later. In discussion with a consortium member after the Oban event, an adult who did not attend the engagement event later related information about deep sea mining and hydrothermal vents that she had learned from her daughter, who did attend the event. This secondary impact is virtually impossible to measure, but has great impact.
- 'Place' is important. Engaging with local communities, with a mix of locally relevant and exciting global issues worked well. Members of the public knew about the big issues - e.g. from
- BBC's Blue Planet series and other media, but were interested in how those issues affected them and their communities on a local basis. In this sense local public engagement activities can serve to make global issues relevant to individuals, and important for embedding knowledge and opportunities for action or lifestyle changes which might otherwise be widely communicated in national media.

ENCOMPASS: That it is based on long-term relationship that build trust and shared values. It is not presenting information or data – it revolves around 'working with' as this reduces the power imbalances and reduces inequality rather than perpetuating it.

Outcomes and impacts of the projects

Achieving the outcome: Successful consortia working

ENCOMPASS: Stage 2 bid submitted including several key stage 1 partners and new critical friends. Importantly, the stage 2 bid is a combination of OPENER and ENCOMPASS consortia members. All original ENCOMPASS partners are part of the stage II submission.

Future of Our Seas: Key to our success was building together, and then working as, an effective consortium. The challenge of bringing together research institutions, engagement, advocacy and environmental arts organisations as a coherent whole was overcome by compiling a knowledge audit and sharing the same training that participants would receive in order that all members had a shared common language. These replicable tools and techniques are the foundation for effective consortium building.

The Climate Communications Project

- 1) Full delivery of proposed aims and objectives.
- 2) Well-received outputs (report; website; expert elicitation workshop).
- 3) Ability to respond flexibly to new opportunities, working in a coherent way across work packages, as demonstrated by: a) using findings from our early rapid-response survey to inform and adapt the types of written resources we produced for our website; b) responding to opportunities including Green Great Britain Week and COP24 by delivering our findings in new ways, including a video and discussion panel.

OPENER Our initiatives have created the connection between team members that build disciplinary and methodological bridges between organisations. That is, each of our corresponding institutions has structural barriers that we need to overcome to promote opening up science; at the same time, we have identified the opportunities and resources that we have leveraged across our organisations. For our team and building on the trust amongst team members, working in a reflective, responsive and flexible way were key to our successful consortium collaboration (also see above).

Achieving the outcome: Environmental science research is known about, trusted, utilised, and valued

The Climate Communication Project: One novel contribution of the Climate Communication Project is in formalising shared insights and views of UK climate communication practitioners. In doing so, we have provided an important tool for advocating for the value of communication/public engagement research on climate change and environmental science more broadly. Our report that benchmarks the evidence base and areas of agreement on climate change communication (including public engagement) is an important trust-building tool, both within the environmental science community and externally.

Achieving the outcome: Environmental science research is known about, trusted, utilised, and valued (cont'd)

ENCOMPASS: This is at the core of how community organising meshes with environmental science in achieving the aim of making the latter relevant to peoples' lives. ENCOMPASS projects (i.e. action developed from listening) consider these aspects and use them in evaluation.

In addition, there is a preconception that environmental science is not trusted or valued by communities that do not proactively engage with it. A common outcome was that communities do care about, value and wish to change how they interact with their environment at both local and global scales. The feeling of powerlessness at the enormity of the problem or lack of understanding about infrastructure or local governance's ability to respond, make other issues more tangible. However the environment, climate and resources are real issues in everyday life and we found that below the surface of traffic congestion, housing, waste management, refuse collection, that communities normally report, lie real environmental concerns and opportunities to develop meaningful impact.

Some notable examples:

- Work with the environment theme of Action Lozells (through Aspire and Succeed)
- Birmingham Clean Air Zone and new string of organising around this issue
- Work understanding the role urban areas play in biodiversity and potential food production has led to a student professional placement to support community groups in developing a habitat plan at Highbury Park

OPENER: Through our wide range of outputs and, we have increased participants' knowledge and trust in environmental science research, for example through involvement in Pint of Science, where consortium member and NERC scientist Professor Ed Hawkins, along with other scientists, presented their research and were available to engage in discussions with audience members. Feedback from participants at our national CoP workshop in Birmingham also highlighted that the ability to meet NERC scientists was important for good public engagement.

The joint workshop with UKEOF as well as our joint Policy Roundtable on 'Integration of environmental citizen science into environmental policy', which included representatives of UK national agencies and citizen science stakeholders, both took the next step towards getting environmental science research utilised and valued with new audiences and in new ways. The policy roundtable focused on four topics: environmental policy landscape; public engagement & behaviour change; science & innovation; and data standards (Figure 3). Bringing policy makers and scientists together in this format is necessary to further collaboration and consideration from both sides and thus further trust in, and utilisation and importance of environmental science research.

Achieving the outcome: NERC Public Engagement is known about, trusted, utilised, and valued

ENCOMPASS: As part of initial 121 or house meetings the role of NERC was often explained and that ENCOMPASS was about PE of research – this was valued by all and generally a feeling of being pleasantly surprised that time was being taken to engage with them. Notable examples are partners in ENCOMPASS who represent a novel audience for NERC research..

The Climate Communications Project: We have developed the evidence base for NERC public engagement, and promoted this to audiences beyond the NERC community including government, UK research centres, universities and third-sector organisations. We know that many people have found the resources useful and word-of-mouth recommendations have helped amplify our work. Our public engagement project has attracted attention from international audiences, and been promoted at significant events including Engage 2018 and COP24.

Opening up science for all : Public engagement is key to democratisation of science and bringing relevant local concerns into environmental research. Through Engaging Environments, NERC has enabled the focus, space and time needed for many new actors, in science and outside, to realise the importance, value and opportunities related to public engagement. The *Opening up science for all* team reached out broadly through a survey, meetings and workshops to further discussions around public engagement with environmental research and NERC's objectives for this.

- **Survey:** through our survey, respondents were asked to think about their experience with public engagement and their interest in a national CoP around public engagement with environmental research. From the responses, we identified the ten challenges and barriers that people involved in public engagement and citizen science are facing, i.e. a) funding, b) engagement, c) time, d) recognition, e) data quality, f) communication, g) volunteers, h) capacity and skills, i) case studies, j) expectations (all the details on our blog: <https://research.reading.ac.uk/openupsci/2019/01/16/challenges-and-barriers-to-public-engagement-and-citizen-science>). The challenges and barriers highlight important areas where NERC could further support environmental researchers with their public engagement activities, ensuring increased knowledge and utilisation, as well as enhancing trust and value in NERC public engagement.
- **Workshop:** Joint *Opening up science for all* and UKEOF workshop on 'Maximising the benefits from citizen science for monitoring the environment': The workshop provided an opportunity to highlight NERC public engagement and Engaging Environments, and the importance of knowledge exchange through a CoP (<http://www.ukeof.org.uk/resources/citizen-science-resources/cs-workshop-jan-2018-report/view>).
- **CoPs:** Local and national *Opening up science for all* workshops and events provided opportunities for discussion and knowledge exchange around public engagement, as well as showcasing how it could be done, e.g. through Pint of Science events which were showcased on BBC South News.

Achieving the outcome: Cultural and structural changes in environmental research community

ENCOMPASS

- Deeper understanding through 1-2-1s with researchers
- ENCOMPASS focused on community
- NERC funded innovation placement – looking beyond PE as the only way to engage with communities, by reducing barriers/bridging the gap between policy and business support and PE.
- Project partners highlight that some staff meetings had used organising methods (rounds) during meetings with good success
- Public Engagement Professionals were keen on organising techniques to develop institutions
- The project and the organising method has built relationships primarily between University of Birmingham departments including Geography Earth and Environmental Science in the College of Life and Environmental Science and College of Social Science, but also College of Arts and Law.

ENCOMPASS practiced broad based listening which included 1-2-1's with research colleagues. Some important messages that came through from this highlighted that there remain preconceptions and limited understanding about where public engagement fits and what it even is. There is however general enthusiasm in the ECR and postgraduate community who seem to be more socially and community aware in terms of their role in society. The principal challenges from ENCOMPASS' listening with academics, NCCPE's EE Hub and government surveys about public perceptions of science remain with the value of public engagement. Therefore ENCOMPASS' core vision that environmental research should be relevant to everyday lives remains an aim.

A consistent message that comes through from public engagement practitioners and a range of surveys including government and relevant aspect of EE related surveys by other projects (NCCPE and Climate Communication) is of the challenge in reaching out to 'hard-to-reach' or 'underserved' groups. Although these terms are used frequently, there is no established definition of what they actually refer to and who they may be and why if mostly from speculation and assumption. This is likely because these groups are simply not known. Community organising, by design, seeks to engage with a broad base of institutions and people and therefore has some of these groups built into the methodology.

An important success from ENCOMPASS is in extending the remit of community organising with environmental science beyond public engagement with a NERC Innovation Fellowship. This Fellowship continues the work of ENCOMPASS but focuses on building the capacity in Citizens UK and community organising. This funding success demonstrates the value of community engagement and bridges the activity and motivation to work across the academic-community interface.

The Climate Communication Project: We have been working towards a cultural transition to more evidence-based public engagement practice. Our rapid-response survey reached nearly 180 experts working in climate communication in the UK, and formed the basis for a network of expertise in this field.

Our resources will enable researchers to build public engagement strategy based on solid evidence. Our online resources were shared by several high-profile twitter accounts including NERC, Grantham Imperial, Centre for Understanding Sustainable Prosperity, and the National Centre for Coordinating Public Engagement (NCCPE).

We formalised the learnings from our community co-production workshops into a journal article, published in the open access journal *Communicating GeoScience*. This will help our work reach academic audiences, contributing to the 'culture change' we seek to support.

Achieving the outcome: Cultural and structural changes in environmental research community (cont'd)

OPENER: Depending on community or institutional structures, priorities and scale, culture change can happen slowly or fast. In all cases, it takes conscious work and many conversations and discussions to affect the status quo and get new priorities agreed, especially at a national level. The national CoP events during Stage-1 showed how diverse audiences can come together and create new ideas and visions much quicker and with more impact through discussions, collaboration and knowledge-exchange than individuals, alone in their institutions, thus again highlighting the importance of a national CoP. At a local level, it may be a question of realising the potential already present, but not utilised, within institutions; for example, in two local CoPs there were several pockets of environmental science public engagement ongoing within one organisation even though they were not aware of each other. Connecting such pockets creates momentum and allows CoP members to support each other in pushing change through faster. At one CoP host institution, public engagement is now recognised and is part of their promotion criteria, something the *Opening up science for all* team would like to see in all universities and research institutes. All four local CoPs continue their work to change the culture within their local institutions as well as among the wider environmental research community they engage with.

The environmental research community is large and diverse, and effecting the culture change needed for public engagement to be fully recognised as a valuable part of the research process will take time. Working with researchers, organisations, practitioners, and communities as part of *Opening up science for all!*, we collectively identified the following 5 themes that need to be part of any discussion around culture change and future work in the area of (a national community for) public engagement and citizen science in the UK. The themes were distilled from small groups discussions at a project partner meeting in April 2018:

Disruption and risk-taking

Identifying disruptive practices to:

- challenge negative or out-dated individual/organisational assumptions and perceptions around participatory forms of public engagement (esp. citizen science);
- introduce new disciplines and forms of knowledge and expertise; and
- accommodate new participants that have not yet been involved in citizen science around environmental research

Communication and networking

Developing traditional and innovative online and face-to-face communicative tools and techniques to facilitate:

- greater cross-disciplinary learning and training on participatory forms of public engagement;
- improved access to shared assets such as best practice; and
- fast track networking and the brokering of existing and new relationships around citizen science

Collaboration and sharing

Exploring current and potential forms of collaboration between individuals and organisations in order to:

- share best practice and success stories;
- facilitate new collaborative endeavours; and
- extend beyond contributory to collaborative and more co-created forms of citizen science

Innovation and horizon-scanning

Maintaining a critical eye on contemporary practice to:

- collectively develop existing and new forms of participatory public engagement;
- embed ways of thinking, being and doing from beyond traditional science engagement endeavours.

Achieving the outcome: Cultural and structural changes in environmental research community (cont'd)

OPENER (cont.)

In particular, this relates to how environmental research and knowledge is used by a range of different people, and how people's different relationships to and knowledge of the natural environment are valued

Championing and advocacy

Designing processes and structures to support and expand the profile of citizen science in the UK in relation to exciting combinations of academic science, policy and evidence, engagement practice, and public involvement, as well as challenging and co-creating new forms of participatory research and science

Bringing different perspectives into the conversations with scientists, like we did at the national CoP workshop in Birmingham where artists, community members and NGOs were also present, kick-started discussions and showcased the value of innovative approaches to public engagement

Achieving the outcome: Confidence and action in research community

OPENER: Participants in the online training courses have indicated that their confidence has increased to a level where they would now either consider or actually do public engagement or citizen science (see quotes above), highlighting the importance of capacity building among environmental researchers and the wider practitioner community. Also participants at various local and national CoP events have indicated that these events have increased their confidence, and many made new contacts which may lead to innovative actions in public engagement, thus highlighting the need for a national CoP. Participants also indicated the breadth of existing activities around public engagement that could be expanded to include the NERC environmental science community. The need for a CoP for public participation in environmental research was also evident in our workshop at the European Citizen Science Association conference where participants asked for more opportunities to share failures and meet diverse stakeholders in informal face-to-face meetings to be able to share knowledge and experience more effectively .

Our local CoPs are also great for boosting confidence through knowledge sharing and peer support. At our project kick-off meeting in Salford, two environmental research community members of the future local CoP were present and participated in our discussions. For one of them, this participation increased her confidence and enabled her to go on to host the first Women in Environmental Science event and thereby significantly increase the reach of the local Manchester CoP.

Achieving the outcome: Confidence and action in research community (cont'd)

ENCOMPASS: Community organising is meant to be accessible to a range of community groups and holds inclusivity as a central tenet. This accessibility should extend to academics who wish to practice organising or use the principles of organising in their engagement strategy.

Working on a 1-2-1 basis with communities in often a challenging setting and developing a relationship where you must share your own story can be off putting to some researchers. This does not make the practice irrelevant or not useful to them. The concepts of motivation and power analysis can be used and the practice can be employed at a research group level as effectively as a method to assist public engagement leaders in brokerage and organising of engagement strategies. Furthermore, organising allows a way of building a broad spectrum of researchers from different disciplines and engagement professionals to build robust teams

Achieving the outcome: Tools and approaches used during the project are shown to be working well, and continue to be utilised following project

ENCOMPASS: Several projects are ongoing including Earthwatch working with a primary school on development of forest school facilities. ENCOMPASS has helped to direct Citizens UK Birmingham to new approaches to organising concerning Birmingham City Council's clean air initiative.

Our concept has attracted separate funding with a NERC Innovation Fellowship to build on ENCOMPASS and work on now building Citizen UK's capacity in environmental science.

The Climate Communication Project: We created a rapid-response survey to benchmark the state of UK engagement with climate change. With this tool, we created a register of expertise and captured a set of best practices based on responses from 178 experts. This tool could be adapted for other environmental science topics and we have included our learning points from this process in our project evaluation that is openly available on our website.

Our process of expert elicitation was based on the tried and tested methods used by the International Panel for Climate Change. We found it was effective for capturing a set of confidence statements about the science of climate change communication. Our findings were published in our report, *Climate Communication in Practice*, and are going to be replicated in a major Swedish Environmental Communication programme (pending funding approval) to assess and better understand expert views on environmental communication in Sweden.

We distilled a large amount of academic research into accessible online blog-posts. This informal writing style enabled a wide range of audiences to access our work, and our 20 evidence review blog-posts helped our website achieve over 9,000 page views from over 3,000 users.

Achieving the outcome: Tools and approaches used during the project are shown to be working well, and continue to be utilised following project (cont'd)

OPENER:

- **Website and blog (available beyond the lifetime of Stage-1):** The ten blogs and the extensive resource library provide a valuable source of information and inspiration to anyone interested in public engagement and citizen science. All resources are still available on our website.
- **Online training course (available beyond the lifetime of Stage-1):** The UCL Massive Open Online Course (MOOC) 'Introduction to Citizen Science & Scientific Crowdsourcing' (<https://www.ucl.ac.uk/lifelearning/courses/citizen-science-scientific-crowdsourcing>) was developed partly with input from the *Opening up science for all* team, and attracted over 700 participants when it ran from January to March 2018. It has been reviewed and adapted based on feedback from participants and lecturers (Figure 9), and the course is currently running with over 240 online participants. Based on feedback and evaluation of the UCL MOOC, the *Opening up science for all* team created five easily accessible modules on topics relevant to citizen science and public engagement (<https://openupsci.wixsite.com/citizensciencecourse/an-introduction-to-citizen-science>) which will be available online for at least two years.
- **CoP approach:** (1) initiating local CoPs (now self-sustaining). As described previously, initiating a local CoP depends on many factors and can be done in a multitude of ways; there is no right or wrong way, but there are general ingredients that anyone wishing to initiate a CoP would do well to consider (Figure 1). These considerations are not only relevant when initiating a CoP, they are important throughout the duration of the CoP, and our local CoPs continuously consider these things; and (2) similarly to the local CoPs, scoping out the national CoP included many different approaches and ways of engaging with a wide range of current and potential public engagement stakeholders. This has resulted in a sense of community amongst people not previously connected, though at the national level this emerging CoP needs internal and external capacity building and dedicated resources and support to fully materialise and reap the benefits of the Stage-1 project – something the *Opening up science for all* team aim to achieve in our Stage-2 project.
- **Evaluation framework:** A comprehensive evaluation framework was developed and implemented for the project, including formative, developmental and outcomes evaluation elements (Figure 10). This approach worked well and provided an important basis for bringing the team together initially around identified shared values and objectives for the project, during the project through shared learnings from the CoPs, and at the end for collating the lessons learned during the project as input into the development of the Stage-2 proposal. A similar approach is envisaged for the Stage-2 project.

Achieving the outcome: Successful stakeholder/ public groups engagement

ENCOMPASS: Strong partnership with Citizens UK and ongoing relationships with their members

The Climate Communication Project: We hosted three co-production community workshops with Avonmouth Community Centre, Disability Stockport and Manchester Faith Groups. We used this workshop space to open a dialogue about climate change with traditionally underserved communities, and used creative poetry-writing to facilitate the discussion.

We ran a successful expert elicitation workshop for climate communication practitioners (the first of its kind) for 14 public engagement professionals across academic, civil society and media.

We ran a workshop, hosted a storytelling table and presented a poster at the Engage 2018 conference. Here, we built on the public engagement network established by the National Centre for Coordinating Public Engagement and showcased our work to professionals within the sector, inviting conversations about our methods and findings.

We kept in touch with NERC and the Engaging Environments network by attending meetings and workshops to share our progress and ideas.

Opening up science for all: As evidenced above, the *Opening up science for all* team has successfully engaged with a wide range of stakeholders/public groups, including:

- NERC researchers, other environmental researchers and university staff, community groups, NGOs, artists and public engagement practitioners through our national and local CoP activities and events;
- Policy makers and other citizen science stakeholders through our joint Policy Roundtable;
- Public engagement professionals, academics, practitioners and others interested in public engagement through our online resource library and blogs;
- Early career researchers, other academics, practitioners and other members of the public interested in citizen science through our online training course.

For us, Stage-1 focussed on capacity- and consortia-building, rather than delivery of public engagement activities per se. However, our local and national CoPs were successful with events and activities, whereby face-to-face encounters provided rich interactions and exchanges. One example is the Manchester CoP which has been very successful with engagement in a variety of different settings, from the Community Science Showcase at the university festival and collaboration with libraries, to the extension of CoP activities via the Women in Environmental Science events. Through these activities, the CoP has engaged with a multitude of people, always ensuring an open space for listening and sharing concerns about the environment and local community. Only through listening and engaging deeply with community members, avoiding one-way communication from researchers to the public, can the real benefits of public engagement materialise.

Achieving the outcome: Sector-wide advocacy of the NERC Public Engagement vision

ENCOMPASS's core aim was to work toward the sharing of the research agenda which speaks to the research being used, valued and trusted 'by all'.

Throughout the **Climate Communication Project's** activities we have been careful to ensure that NERC's role as our funder was clearly noted and recognised, and our advocacy for evidence-based public engagement is a clear fit with the NERC vision for credible and impactful public engagement

Opening up science for all continuously promoted the vision of a society in which research is created, used, challenged, valued, and shared by all, through a range of activities, including:

- **Local and national communities of practice activities and events:** The *Opening up science for all* team held two national visioning events (Figure 5) and organised local CoP events and activities in four locations giving visibility to NERC's public engagement vision and objectives through discussions, workshops and knowledge exchange involving a wide range of stakeholders.
- **Workshop presentation 'Sharing the Love'** at the European Citizen Science Association conference in Geneva: participants engaged in speed networking and shared challenges and successes in citizen science, and shared what they had learnt from each other (Figure 6).

Achieving the outcome: Consortia that work in a reflective and responsive manner. They are open-minded to sharing learning, and have a flexible approach to future opportunities.

The Climate Communications Project: Our consortia responded to challenges and opportunities throughout the project, demonstrating a flexibility that is only possible with effective communication and a cohesive vision of what we were trying to achieve.

We have been transparent about our entire process from project conception to evaluation. Our website and social media tag #theclimatcommsproject have documented updates throughout our project, including ongoing feedback, progress updates, and our summative evaluation. Over 900 interactions on social media, and 24 comments on our website suggests that our audiences have been actively listening to our shared learnings.

We have used feedback to continually refine our project plans. Our project partners often provided a sounding-board and feedback loop for our plans. For example, our rapid-response survey was reviewed and amended following feedback at a workshop attended by our project partners. Likewise, after initial positive responses from publishing our report online, we decided to mail out hard copies to a list of over 250 contacts provided by project partners.

On an international level, team members proposed, and had accepted, an official event at the United Nations COP24 conference in December in relation to climate change communication. We organised this in conjunction with the Tyndall Centre for Climate Change Research, the China Climate Change Communication Project, Climate Outreach, and Monash University Climate Change Communication Research Hub (Australia). This event discussed the findings of the project's research, and we hosted a discussion with co-panelists and around 80 audience members including policy-makers, communicators and scientists. The panel at COP24 was itself a flexible response to an opportunity that emerged.

Achieving the outcome: Consortia that work in a reflective and responsive manner. They are open-minded to sharing learning, and have a flexible approach to future opportunities. (cont'd)

ENCOMPASS

- Organising provides a set of principles that rely on iterative reflexive approaches
- Funding structures preclude flexibility without dynamic thinking and pushing of boundaries.
- Research ethics can present conflicts.
- Institutional auditing rules present barriers

OPENER: Our consortium, through monthly calls and our face-to-face meetings, maintained good contact and had open, reflective, and valuable discussions throughout the project. Reflective baseline, mid-project and final interviews were conducted with team members as part of our evaluation package, providing insights into a range of important topics such as motivations, challenges, opportunities, and lessons learned, which were then shared and discussed within the team. This reflective approach created trust and ensured that the team could learn from each other and respond in appropriate ways to any challenges and opportunities arising. For example, the local CoPs were initiated in very different ways due to differences in organisational ways of working, structures, and interest. One CoP is institutionally internally focused as there is a need to build awareness and recognition for public engagement before reaching out. Another CoP also started that way, but has quickly expanded to include other regional actors, and a third CoP was initiated through involvement in external activities first to showcase how impactful such activities can be and thereby build institutional support for public engagement. Our team shared experiences about building CoPs and collaboratively were able to suggest innovative ways forward when challenges appeared, thus resulting in the successful establishment of four CoPs.

The Stage-2 consortium building and bid process necessitated an open-minded sharing of learning amongst all projects at NCCPE meetings, as well as a flexible approach to identifying the best possible consortium for an impactful Stage-2 project proposal. For both Stage-1 and Stage-2 projects, our team focused on future opportunities and leveraged significant in-kind contributions from a range of stakeholders in environmental research.

Future plans for the projects

Climate Stories: We are updating our website with new materials including films, blog posts and podcasts. We are interviewing the climate scientist participants a final time and this additional evidence will be used for further analysis and the development of paper or papers for submission to peer-reviewed academic journals.

ENCOMPASS: These are captured in the stage II bid. Aside from stage II, an ongoing relationship with Citizens UK and development of community organising practice as a core aspect of public engagement practice is a longer term vision.

OPENER: Stage-2: We have taken the learnings from our Stage-1 project and the extensive network we have developed to submit a Stage-2 bid to NERC. This is in partnership with ENCOMPASS (another Stage-1 project).

On-going/legacy: The Stage-1 *Opening up science for all* project was about scoping out of a national CoP for public engagement with environmental research. Over the course of the project, we experimented with initiating local CoPs in ways that were meaningful to them which resulted in four different approaches and CoPs. Actually initiating local CoPs has meant that expectations had to be managed and local support found to continue the work of the CoPs after this project ended. This has been possible to a larger degree than expected and the CoPs are now running independently and successfully, thus showing that an initial investment in time and resources for one year has ongoing positive impacts to make local CoPs flourish, each in their own way. There is momentum and enthusiasm presently among researchers, practitioners and communities due to Stage-1 for the establishment of a national CoP which we hope to form in Stage-2 of Engaging Environments.

Outcomes from the *Opening up science for all* project also include a variety of resources for researchers and other public engagement stakeholders to support learning, sharing and innovation around public engagement. These resources will be available online after the project ends, and they include a) the UCL MOOC course on Citizen Science and Crowdsourcing that is currently running for the second time and which will continue to run annually; b) the 'Introduction to Citizen Science' short course which will be online for at least two years; and c) the project website with blogs and a resource library about public engagement. Learnings from *Opening up science for all* will continue to inform consortium and partner organisations in the future on public engagement strategies, innovative collaborations and communities of practice. These learnings will be shared further through future conference sessions, e.g. at the next Communicate conference and the BIG STEM Communicators Network conference, and will be utilised to inform the future UKRI citizen science strategy.

Future plans for the project (cont'd)

The Climate Communications Project: Members of the Climate Communication Project have applied for funding in Phase 2 of Engaging Environments, with a proposed project titled Time To Engage. Time to Engage represents a clear continuation from Stage 1 of Engaging Environments, building on the evidence-based approach, leadership, and networks of The Climate Communication Project, and will expand the focus from climate change to environmental change - thereby ensuring that scientists working across the broad spectrum of NERC's remit can participate. The approach will be underpinned by the learning from and findings of The Climate Communication Project which includes the guidance that 1) public engagement should be geared towards specific strategic constituencies and not just 'one-size-fits-all' communication activities; 2) sustainable public engagement requires long-term support, infrastructure, evaluation and follow-up; and 3) there is a need for more two-way engagement with audiences.

Climate Outreach are adapting the expert elicitation workshop design for use in a proposed four year Swedish programme on Environmental Science Communication.

The National Centre for Atmospheric Science (NCAS) Communications Team are using recommendations from the Climate Communication in Practice report to develop and deliver online training seminars to NCAS climate science researchers throughout 2019.

The **Engaging Environments Hub** will continue to share the legacy and learning from Engaging Environments project, through the shared resource and partnerships forged during the process. The **Engaging Environments booklet** will be hosted on the NCCPE website, and printed copies will be distributed to the wider sector.

The NCCPE will continue to work in partnership with the Future of our Seas project team and the Natural History Consortium on a DEFRA-funded project, **Citizen Engagement on the Environment**. This projects uses a mix of innovative and established public engagement methods to generate a high quality understanding of what people value in the environment and their priorities for policy. In addition, the project will build capacity among environmental experts to communicate their knowledge and establish an approach to public consultation that can be used again in the future.

The partnership involved in the successful bid for this project is a result of working closely and forming strong working relationships with the Future of our Seas project and the Natural History Consortium throughout the Engaging Environments programme.

As part of our wider remit to support capacity building and excellent public engagement, NCCPE will strive to maintain excellent relationships with all of the project teams and endeavour to work with them wherever possible to enhance any future work they do. The NCCPE will also continue to work closely with NERC to support their Public Engagement Vision going forward, drawing on wider sector knowledge as well as learning from the Engaging Environment process.

Reflections from the Engaging Environments Hub

Bringing together the work of the five funded projects certainly highlights all of the great achievements the Engaging Environments programme has enabled. Collectively the project teams have brought together over 80 organisations to strive towards a shared goal, as well as expanding this reach to the wider sector and beyond through their training, workshops, consultations, meetings, events and new communities of practice.

It's clear throughout these reports just how vital each team found it to invest time and energy into the relationships they were building, be they with members of their own consortia, the academics they were training, or the audience groups they were engaging with. As well as contributing to strong consortia, this was also found to be crucial for ensuring high quality public engagement with environmental science.

Much of the key learning from the projects around consortia-building, working with academics and planning high quality public engagement activities can be found in the Engaging Environments Booklet, as well as lessons learnt about how to ensure these efforts are being supported in a long-term, strategic way. You can view the Engaging Environments Booklet [here](#).

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