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## Across the Continents: communicating ecology to schools in Cambridge and Southeast Asia

Sara Steele

Address: University Museum of Zoology, Cambridge, Downing Street, Cambridge, CB2 3EJ, UK

Email: sls72@cam.ac.uk

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### Abstract

*Across the Continents* is an exciting pioneering project combining expertise within current species conservation research and museum learning. Taking advantage of the planned dissemination outcomes of four well-established NERC-funded projects, the team tested how the newly-renovated University Museum of Zoology could act as a stage for engagement activities and as a source of expertise in communicating with a variety of audiences.

This new way of working seeks to inform future collaborations, with a view to make a case for future grant applications to not only consider the Museum as a source of guidance in public engagement activities, but also as a partner right from the initial application stage through to evaluation and impact measuring. Here I will set out the *Across the Continents* project case study, the lessons learned and successes achieved, and consider why more museums should be seeking to promote their aptitude in sharing the unfamiliar.

**Keywords:** Collaboration, Research Excellence Framework, engagement, ecology, dissemination, conservation, schools, communication, training

### Introduction

Museums across the UK are looking for new sources of funding (Mendoza, 2017) and strategies that will allow them to continue to prioritise critical public-facing work and combat an increased demand for curriculum-focused school visits (Museums Association, 2018).

The University Museum of Zoology is embedded within the University of Cambridge's Department of Zoology and has long had a relationship with the department and its researchers. Much to the Museum's advantage, the students and researchers

associated with its curators are based within the museum itself, providing valuable, easy to access, ongoing science. Furthermore, both department and museum are increasingly looking to the Museum team to be the bridge between current research and the public, helping researchers to share their findings to as wide an audience as possible.

In an effort to go beyond displays and exhibitions as a way of reaching these audiences, the *Across the Continents* project took advantage of the dissemination activity aims of four linked Natural Environment Research Council (NERC) El Niño projects. These aims primarily focused on sharing



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their research methods and findings with non-specialist audiences in a sustainable way. *Across the Continents* had two strands: a 17-day study tour for scientific staff of research stations in Southeast Asia and Oceania; and a museum-led schools communication project, based in the UK and Southeast Asia.

#### *The Projects*

The effect of El Niño for much of Southeast Asia and Oceania is drought, with associated risks of fires and crop failures. Drought is predicted to have effects on ecosystem processes spanning across the land-use gradient from primary forests to logged forests and plantations, with the highly diverse forest environment being the most resilient to these effects. The projects all aim to monitor landscape responses to the most recent El Niño event, to inform resilience strategies, and to make a case for the promotion of biodiversity as part of best farming practice to increase resilience to climate events and, thus, yield.

This is especially urgent within a region where the conversion of forest to plantation is rapidly expanding, and much of the biodiversity that is supported by a rainforest landscape is being lost, with further consequences for the region's inhabitants, ranging from a crash in food supply to poor water and air quality.

#### *Study tour*

The aims of the *Across the Continents* project were threefold: to disseminate El Niño project findings around research stations in Southeast Asia and cement links between stations; to reduce dependency on support from outside of the region; and, most importantly for what I shall discuss here, to increase the capacity of the participants in communication, both in formal presentations to stakeholders, academic researchers, and industry representatives, and in informal activities for school children.

These aims were met on the ground by a study tour. Local researchers from each of the four projects joined Dr. Amy Eycott and me for 17 days, visiting three of the four project sites in turn. This enabled them to share best practice and to communicate their experiences and findings in the field. They received training in how to present their research methods and findings to different audiences and practiced their new skills on a variety of willing spectators. This included a non-specialist (and non-science) audience,

research assistants (who are predominantly employees from the local community), Western researchers, conference audiences, and agricultural industry representatives. The final, and most challenging, audiences for the team were the eagerly waiting classes of school children in Pekanbaru province, Sumatra.

It is worth acknowledging that the dissemination project held an advantageous position from which to begin knowledge-sharing activities, created by the longevity of the four research projects and existing institutional reputations as sources of reliable and unbiased scientific information among the agro-industrial sector in the region. Previous close collaboration with networks such as the Southeast Asia Rainforest research Partnership (SEARRP) and organisers of the International Conference on Oil Palm and the Environment (ICOPE) allowed for existing networks to be utilised when looking for industry representative participants.

The work done through the project also aims to begin combating what is called 'parachute science' (Harris, 2004), where researchers from outside of the region gather their data, formulate their conclusions, but share the results only with their home institutions and communities. By giving local researchers the ability and authority to present on the findings and an understanding of why the data has been collected, and what it has shown us, the current science can be shared much more easily with the very people whose lives and livelihoods are impacted by El Niño events and land use change.

#### *School project*

The development of informed learning activities for primary school children began in January 2018 with the utilisation of existing connections between the University Museum of Zoology and Cambridgeshire schools. It was important that the El Niño research projects were shared with our own local communities, as well as those close to the research stations, to ensure that we covered target audience aims for all teams and institutions involved. This Cambridge-based component also provided the team with an audience with which to develop and test resources before taking them to schools in Southeast Asia.

The Museum of Zoology has identified a number of target schools as part of its audience development plan. It was important for the Museum team that the school involved within the project was on this

targeted list as they are most likely to benefit from the extra activities and resources, and lead to engaging a new audience with the Museum collections and departmental research. A simple call for interest was sent to target schools, and later conversations with teachers enabled us to narrow the responses down to one that was most suitable, St Luke's Primary school.

As the project progressed, the team worked in partnership with the school's teachers to create a realistic project timetable that could be achieved alongside and within their usual teaching commitments. It was important that the project was manageable for the teachers involved in order to limit the impact of the project on their already busy schedule and prevent communication or commitment drop-off. With this in mind, curriculum themes were considered from the outset of activity design so that the effort of trialling the activities as part of the project would help rather than hinder the school's teaching aims.

In order to gain the most from their participation in the project, our partnership teachers were keen to introduce the project to the entire school cohort, to widen participation within the activities and create a general buzz around the topic of habitat change and biodiversity. Conservation plays a big part in many Key Stage curriculum aims, and getting children excited about the subject can only benefit them as they progress through their schooling (Department for Education, 2013). We began with an introductory creative writing competition, with entries being accepted from the entire school. Children would learn about the challenges that orang-utans face in their wild rainforest home from their teachers, and write an

adventure story featuring and naming an orang-utan. The winning story would assign a name to an orang-utan stuffed toy to be featured in later resources.

The school's Year 4 students were to join us for the remainder of the project and were the first to receive the new school session developed as part of the dissemination goals (Figure 1). This session aimed to provide the children with some knowledge of the concepts we would be coming across during the project, and allow us to test our new activities in a 'real-life' environment.



Figure 1. Year 4, St Luke's Primary during museum-led session, February 2018 ©University Museum of Zoology, Cambridge

The session itself included several activities chosen by researcher Dr. Amy Eycott in the early stages of the project: Ecological Jenga, which demonstrates that the more we remove from an ecosystem, the more unstable it becomes, thus promoting the protection of diversity within a habitat; The Habitat Game, an oversized board game which allocated different

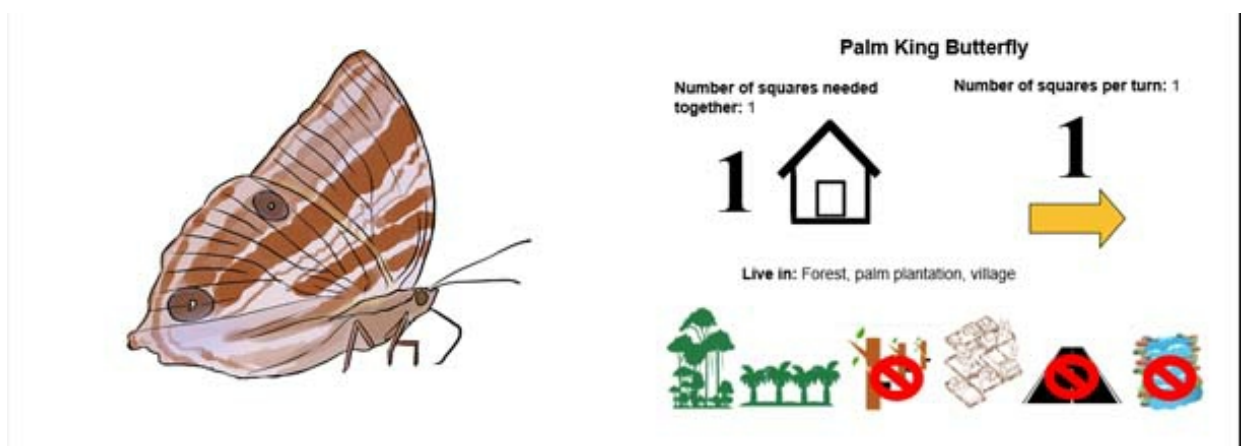


Figure 2. Player animal card for use in habitat game ©University Museum of Zoology, Cambridge

animals to each student player. The habitats would change throughout the game, with each 'animal' being able to survive or thrive depending on their individual movement rules and habitat changes (Figure 2). We finished up by comparing insects from the Museum collection, originating in East Anglia and Southeast Asia, to see how their features compare and considering the reasons behind any similarities or differences.

I found that the students were engaged and very responsive to the activities and the information being shared with them. It was a great learning opportunity for me too, as is any delivery practice using new content. The teacher and I found that the Habitat Game, for example, was attempting to share too many new concepts with students of the age range found in Year 4 (8-9 years), and that each activity would have greater success if completed with fewer children in each group. This experience and feedback was shared with our study tour participants and impacted how further sessions were planned and conducted.

St Luke's Primary would continue their involvement in the project by following the orang-utan toy's journey throughout the study tour, as we travelled to the different habitats covered in our school session, and observing the differences between the research centre sites. By repeating key themes and extending the topic throughout the project, we hoped to cement their understanding and knowledge of the impacts of landscape change and importance of biodiversity.

The children received three videos of our orang-utan toy exploring the field centre sites and thus three different landscapes. These included a rainforest habitat, a landscape going through change, and an oil palm plantation. The videos were shared with the teacher using the Museum's Facebook profile platform (University Museum of Zoology, n.d.), and via Google Drive. The twinned approach ensured that the often-poor Internet connectivity within the research centres, and difficulties with firewalls implemented at schools in the United Kingdom, did not disrupt our sharing schedule. We were also able to keep teachers and the children's parents in the loop via an *Across the Continents* blog (Steele, 2018). A further advantage of the blog was that it provided all those involved in the study tour with a sharable diary, further extending the project's reach by creating links between the research, study tour, and schools project in a language that is accessible for a wider audience.

### *Training in communication*

The primary aim for the partner schools in the Southeast Asia region was to improve schoolchildren's awareness of the challenges posed by habitat and land use change, and the importance of forests for supporting biodiversity. School children are the region's future farmers, agriculturalists, land managers, and consumers. Working with children is known to be an effective way of influencing communities as a whole (Vaughan et al., 2003). By sharing these ideas with the community from an early age we hope to have a long-term impact on farming practice in our study regions.

In order for us to achieve sustainability and longevity beyond the study tour, and for the developed school session to have the widest possible scope and impact, it was important that the study tour participants acquired the skills, resources and confidence to deliver the 'habitat change' session in their local schools. We achieved this through two days of intensive training, including a number of activities and tools that many educators will have come across in their own training. We began with an activity that got the group thinking about how they would communicate their projects to anyone with a lower level of formal education or understanding of climate science (Figure 3). We talked in more general terms about how we could share the information that we learn during our research with different audiences, and underlined words that the average person may not have come across before.



Figure 3. School session training activity, March 2018 ©University Museum of Zoology, Cambridge

It was a surprise to some that terms many considered straightforward, such as what we mean by 'water supply', may not be widely understood. We furthered this by taking a look at St Luke's Primary School's creative writing competition entries. By examining the language level used by children of this age, I hoped to prepare the scientists for what to expect

from children within their own communities, when speaking their first language. This task was especially useful to demonstrate that not all children of the same age will possess the same level of ability, and that it is important to remember that flexibility is key to any teaching environment.

As the training continued, we covered skills that come naturally to any museum educator. These included pitching information at the correct level for different ages and abilities, understanding how children learn through reinforced words and terms, and ensuring that sessions are made up of both energetic (Figure 4) and calm activities to aid the children's learning and concentration.



Figure 4. Participants playing habitat 'twister' to shake off afternoon fatigue, March 2018 ©University Museum of Zoology, Cambridge

Our final activity required our scientists to create bespoke insect identification worksheets, in the languages spoken in their home communities and with relevant insect species, to be used as part of the session. Inspiration was taken from the worksheets that St Luke's Primary would be using for their own insect collecting activity, produced by the Woodland Trust (Woodland Trust, 2015) and recommended by us at the Museum.

#### Session delivery

Working in response to experience and feedback from our partner teachers in Cambridge, the 'habitat change' session was adapted to include a rotation of the three activities (Figure 5), concluding with a full class drawing activity. The children were very engaged, despite the excitement of having different

people lead their lesson. Our scientists were most surprised at how much the children learned from such simple activities.

"Anati and Austin have reported that the objectives and learning points of the Ecological Jenga game and insect collecting activity were understood and enjoyed by most, if not all of the children. It was believed that changes do not need to be made to these two activities in order to suit this age group, but that practice was an advantage and their confidence in delivering the activity grew as the session progressed." (Eycott and Steele 2018)



Figure 5. Children taking part in ecological jenga and insect collecting and identification activities, March 2018 ©University Museum of Zoology, Cambridge

All of the study tour participants said that they now feel comfortable in delivering these activities to their local schools, but that they would need to enlist the help of the schoolteachers, as they would not have the number of team members that we had during our trial sessions. This would incidentally extend the impact of the session to the teachers, with them being able to deliver some of the activities themselves to further students.

As always, with further delivery practice came further changes that needed to be made to the session. The most notable and immediate change was that with each session, the participants found that the Habitat Game was still attempting to tackle too much for the age group at hand. However, remembering the activities covered as part of the training, they

remained flexible and were able to simplify the players' 'movement rules' as the session progressed.

"Ribka and Amy found that by the end of the session, they were able to simplify the game during delivery so that most children understood the wider concepts and learning objectives (i.e. that animals need different habitats to survive, with larger animals also needing more space)." (Eycott and Steele 2018)

They did, however, observe that the older children, watching the game during their break-time, understood the rules and were assisting their younger peers. A game of such scope can be used with a range of ages, something that will be considered when formatting the game as a downloadable teaching resource.

The schools' involvement, both in Cambridge and Sumatra, concluded with observational drawing of the insects they had caught and identified. These drawings were then shared between the schools, in a 'penpal pictures' scheme (Figure 6) to encourage the children to think about the differences and similarities between the two environments, and, most importantly, how habitat change can affect all creatures, no matter where you are.

#### Embedded evaluation

In order to ensure that thorough evaluation was conducted at every step of the study tour and schools project, I implemented the use of an impact measure or logic model (Arts & Humanities Research Council, n.d.). This ensured that we considered why and how each phase of the project was useful and meaningful, and that we could use each activity to inform the next. The expected consultation with teachers and

researchers, and statistics from blog post and video views, were recorded, in addition to feedback forms completed by the students themselves. It is new but now common practice to consult project participants directly, in place of asking a representative such as a teacher to answer in their stead.

Crucially, in order to gain comparable feedback from the children, it was important that all classes completed the same form (Figure 7). An adaptable form, with images to assist with understanding and interest, was created, with our researchers translating the text for our Bahasa-Indonesia speaking schools.

#### Implications for museum collections

The issues tackled as part of the research projects have strong links to natural science museum collections worldwide. The consequence of a connected, shrinking world, is that we are losing much of the biodiversity represented within our collections. The potential for sharing with and informing audiences on habitat and species conservation is vast, with the results far-reaching. Museums can use their natural history collections and reputations as trusted sources of information to highlight local issues, create relevance and empower contributions. National Museum Scotland have done just that in employing digital resources to highlight Scottish wildcat conservation efforts and how pet owners can contribute to its protection (National Museums Scotland, n.d.)

The *Across the Continents* project will begin by sharing the content created as part of the schools communication project with teachers via the University Museum of Zoology website and social media platforms. Current efforts are looking to create



Figure 6. Drawings shared between schools in Cambridge and Sumatra, April 2018 ©University Museum of Zoology, Cambridge

a complete teachers' pack, containing activities, resource sheets, videos, and teaching tips surrounding the topic of habitat change. It is expected to be available in January 2019.

Furthermore, there is great scope to create useful, reliable resources for local schools in the United Kingdom. Moving forward, we hope to link the topics covered in this project with the dissemination goals of a collections-based research project. Funded by Arts Council England, postgraduate students and researchers are exploring what we can learn about habitat and land use change from insects collected by Leonard Jenyns in the then-wet fenlands of 1829. Combining the two projects will not only extend the reach of each dissemination activity, but also hopes to create reliable links between communities that are so easily considered to be worlds apart, promoting equality in diversity.

The University Museum of Zoology benefits greatly in collaborating with researchers on their dissemination activities and the public engagement team is using the current, relevant science to inform and create exciting new sessions, events, and resources. Museum collections, especially in natural science, are incredibly and increasingly important for research and are already constantly utilised by students, researchers, and curators. By using and speaking to researchers in a language that translates directly to the Research Excellence Framework impact measures (Nature, 2015), museums open up a gateway to potential funding and collaboration opportunities.

*Conclusions: looking to the future*

As a museum learning professional, being involved in the dissemination project has definitely had its benefits. I have been able to learn about, connect

with, and grow as passionate about our insect collection as the researchers who study it. I have created working relationships that continue to benefit and inform my day-to-day working practice, and am now building on this experience to convince researchers that the Museum team holds the tools they need to produce beneficial resources for wider audiences. Indeed, consultation with researchers developing the *SciEd network* based in Germany is already leading to the publishing of advice for students wanting to share their research in new, innovative ways (SciEd, 2018).

While the real delivery and evaluation is still ongoing, the participants of the study tour are our biggest legacy. They have gained the confidence and skills to present their work and deliver school sessions across Southeast Asia, and to the communities that can directly benefit from the research outcomes.

The advice I would give, and the conclusions I would draw from the project, now that *Across the Continents* is reaching the end of its implementation phase, are threefold:

Where possible, be involved from the beginning. It is not unusual to find that dissemination activities are left until the end of a research grant period, with panic-stricken colleagues seeking quick evaluation outcomes. Implementing any kind of activity with external audiences takes time and consideration in order to be completed with the best possible results, and I will certainly be using this project as an example of how the Museum team can achieve real results when given the time and resources to do so.

Empower researchers to deliver the activities alongside you. I found that asking colleagues and

*Across the Continents Schools Feedback – For Students*  
Please circle your answers

Can all animals survive in all habitats?  
 Yes     Do not know     No

Which living things are the most important to keep balance in our ecosystem?  
 Carnivores (meat eaters)     Plants     Do not know     All Living Things     Herbivores (plant eaters)     Detritivores (earth eaters)

Should we provide homes for native wild animals within our human landscapes?  
 Yes, we should make homes that suit our native animals     Do not know     No, they will survive without a home

How can we make our farmlands better for living things?  
 Give them a wild spaces to live     Make sure they can move from one wild space to another     Let wild plants grow     All of these answers

*Across the Continents Schools Feedback – For Students*  
Please circle your answers

Apakah semua hewan dapat hidup di semua habitat?  
 Ya     Tidak tahu     Tidak

Makhluk hidup manakah yang paling penting untuk menjaga keseimbangan di dalam ekosistem kita?  
 Karnivora (pemakan daging)     Tanaman     Tidak tahu     Semua makhluk hidup     Herbivora (pemakan tumbuhan)     Detritivora (pemakan kompos)

Haruskah kita menyediakan tempat tinggal bagi hewan liar setempat dari sudut pandang manusia?  
 Ya, kita harus memberikan tempat tinggal yang nyaman untuk hewan tersebut     Tidak tahu     Tidak, mereka dapat hidup tanpa rumah

Bagaimana kita dapat membuat lahan pertanian menjadi tempat tinggal yang nyaman bagi makhluk hidup?  
 Memberi mereka ruang untuk hidup     Memastikan mereka dapat berpindah dari satu tempat ke tempat lain     Membiarkan tanaman liar untuk tumbuh     Semua jawaban benar

Figure 7. Completed feedback forms from schoolchildren, May 2018



researchers to join in with at least some of the dissemination activity delivery was the most effective way of creating a convincing argument for collaboration, in addition to encouraging them to share their passion for the research they are undertaking with others.

Lastly, and most importantly, make it easy. When working with school teachers, we have found that using keywords, providing ready-made, curriculum-linked content is the best way to get these time-poor professionals and their class into a museum. Researchers can also be time-poor, with pressures on fieldwork and data analysis often overshadowing the project's dissemination goals. By using the same keywords, measurement strategies, and evidence output that is required of researchers when reporting their impact, we make working together the obvious choice.

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### References

- Museums Association, 2018. *Museums in the UK 2018 report, February 2018*. [online] Available at: <<https://www.museumsassociation.org/download?id=1244881>> [Accessed 7 July 2018].
- Harris, E., 2004. *Building Scientific Capacity in Developing Countries*. EMBO Reports 5.1 (2004): 7–11. [online] Available at: <<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1298969/>> [Accessed 7 July 2018].
- Department for Education, 2013. *Science Programmes of Study: Key Stages 1 and 2. National Curriculum in England*. Ref: DFE-00182-2013. [online] Available at: <[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/425618/PRIMARY\\_national\\_curriculum\\_-\\_Science.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/425618/PRIMARY_national_curriculum_-_Science.pdf)> [Accessed 8 July 2018].
- University Museum of Zoology, n.d. *University Museum of Zoology Facebook page*. [online] Available at: <<https://www.facebook.com/ZoologyMuseumCambridge/>> [Accessed 8 July 2018].

Steele, S., 2018. *Across the Continents Project Fieldwork Adventures blog, 18th February*. [online] Available at: <<https://fieldworkadventures.wordpress.com/2018/02/18/across-the-continents-project/>> [Accessed 8 July 2018].

Woodland Trust, 2015. *Nature Detectives Activities*. [online] Available at: <<https://www.nature.com/nature/supplements/collections/npgpublications/impact/hefce1.pdf>> [Accessed 5 July 2018].

Vaughan C., Gack, J., Solorazano, H., and Ray, R., 2003. The Effect of Environmental Education on Schoolchildren, Their Parents, and Community Members: A Study of Intergenerational and Intercommunity Learning. *The Journal of Environmental Education*, 34(3), pp.12-21.

Eycott, A. and Steele, S., 2018. *Biodiversity School Session Delivery Feedback*. [unpublished report].

Arts & Humanities Research Council, n.d. *Logic Models for programme planning and evaluation*, [online] Available at: <<https://ahrc.ukri.org/funding/resources-for-researchers/selfevaluation/>> [Accessed 11 April 2018].

Mendoza, N., 2017. *The Mendoza Review: an independent review of museums in England*, [online] Available at: <[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/673935/The\\_Mendoza\\_Review\\_an\\_independent\\_review\\_of\\_museums\\_in\\_England.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/673935/The_Mendoza_Review_an_independent_review_of_museums_in_England.pdf)> [Accessed 21 November 2018].

National Museums Scotland, n.d. *Explore our Collections: Scottish wildcat*. [online] Available at: <<https://www.nms.ac.uk/scottishwildcat>> [Accessed 10 November 2018].

Nature, 2015. *REF2014 Impact Case Studies*. [online] Available at: <<https://www.nature.com/collections/bsrqmdyjr>> [Accessed 6 July 2018].

SciEd, 2018. *Reconnecting children to nature through multi-cultural collaboration – new insights*. *Blog of SciEd, 28th May 2018*. Available at: <<https://networkscied.wordpress.com/blog-of-scied/>> [Accessed 6 July 2018].