CONCEPT
THE JOURNAL OF CONTEMPORARY COMMUNITY EDUCATION PRACTICE THEORY

Vol. 13, No. 2, Summer, 2022

Co-Design and Conservation: A Case-Study from RSPB Biosecurity for LIFE in Coastal and Island Primary Schools and Youth Groups Across Scotland

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Abstract

Here, we reflect on the process and outcomes of co-designing seabird conservation resources with upper-primary-aged pupils. We focused on biosecurity (protecting wildlife from potential invasive species), an intellectually and emotionally complex topic which includes many social issues alongside ecology. Public awareness and understanding are vital to biosecurity, and we aimed to engage schools and pupils as key stakeholders in their local biodiversity and its protection. Using a youth work approach, we facilitated pupils' direction of their own learning practices and the development of creative, reflective, and evaluative skills. Through co-design, we developed more relevant, desired, and empowering resources than conventional methods could produce. From April to June 2021, we worked with 106 young people across Scotland as part of the Biosecurity for LIFE project, raising local awareness of biosecurity as part of the project's wider conservation aims. Teachers and pupils flourished within the six-week programme and its co-design framework, developing outstanding work and quickly adapting to a novel topic. Teachers saw positive outcomes throughout the Curriculum for Excellence and Learning for Sustainability, much of which came from pupils' generative and collaborative working. The resources produced met the needs of staff and students, including local specificity, flexibility, and Gaelic translation, with pupils' outputs emphasising creative and active ways of learning. We see co-design as a useful and empowering model for conservation education, helping teachers to navigate demanding curricula and pupils to direct their own learning, find their voice, and cover issues relevant to their own experiences.

Introduction

This article reflects on a co-design project which brought the opinions and experiences of teachers and pupils directly into the design stages (Sanders & Stappers 2008). It took into consideration how teachers prefer to teach and how pupils prefer to learn, making the resources more relevant and inspiring involvement in seabird conservation focusing on biosecurity (protecting wildlife from potential invasive species). We share this case study in hopes of spreading co-design within conservation and education (particularly

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where these disciplines intersect) and as a starting point for others considering similar methods.

Biosecurity is a complicated and emotionally challenging topic. Invasive predators on islands can cause far greater impact than on larger land masses (Russell et al. 2017), particularly when considering unique island wildlife assemblages and the social impacts on island identity through wildlife loss and outside intervention (Bruskotter et al. 2019). Both biosecurity measures and wildlife loss affect ecosystem function, agriculture, health, and tourism (Russell et al. 2017), necessitating collaboration between disciplines (Bassett et al. 2016), frequently with divergent values, frameworks, and ontologies. Biosecurity interventions often require lethal control (Russell et al. 2016), including of charismatic species or those familiar as pets. The value judgements which arise here, particularly when resources are limited, are challenging for anyone (e.g., local versus national decision-making, means of eradication, conservation of what and for whom), and teaching about them is a significant undertaking. Despite these complexities, this programme sought to engage young people in biosecurity, as public awareness and understanding are key issues within biosecurity (Courchamp et al. 2017).

This programme's primary objective was supporting young people in the development of their own learning practice (Tierney et al. 2021; Glumac et al. 2022). Using a youth work approach, we sought to empower schools as key stakeholders to actively support biosecurity communications in their area and shape their communities' approaches as they see fit. We aimed to develop creative, reflective, and evaluative skills in young people throughout the co-design process, working within and beyond the curriculum and normal school environment (Hagen et al. 2018; Tierney et al. 2021). This engagement improved self-reported biosecurity awareness locally and helped us design a resource pack to reach more young people, supporting RSPB strategy and conservation objectives (Fig. 1).

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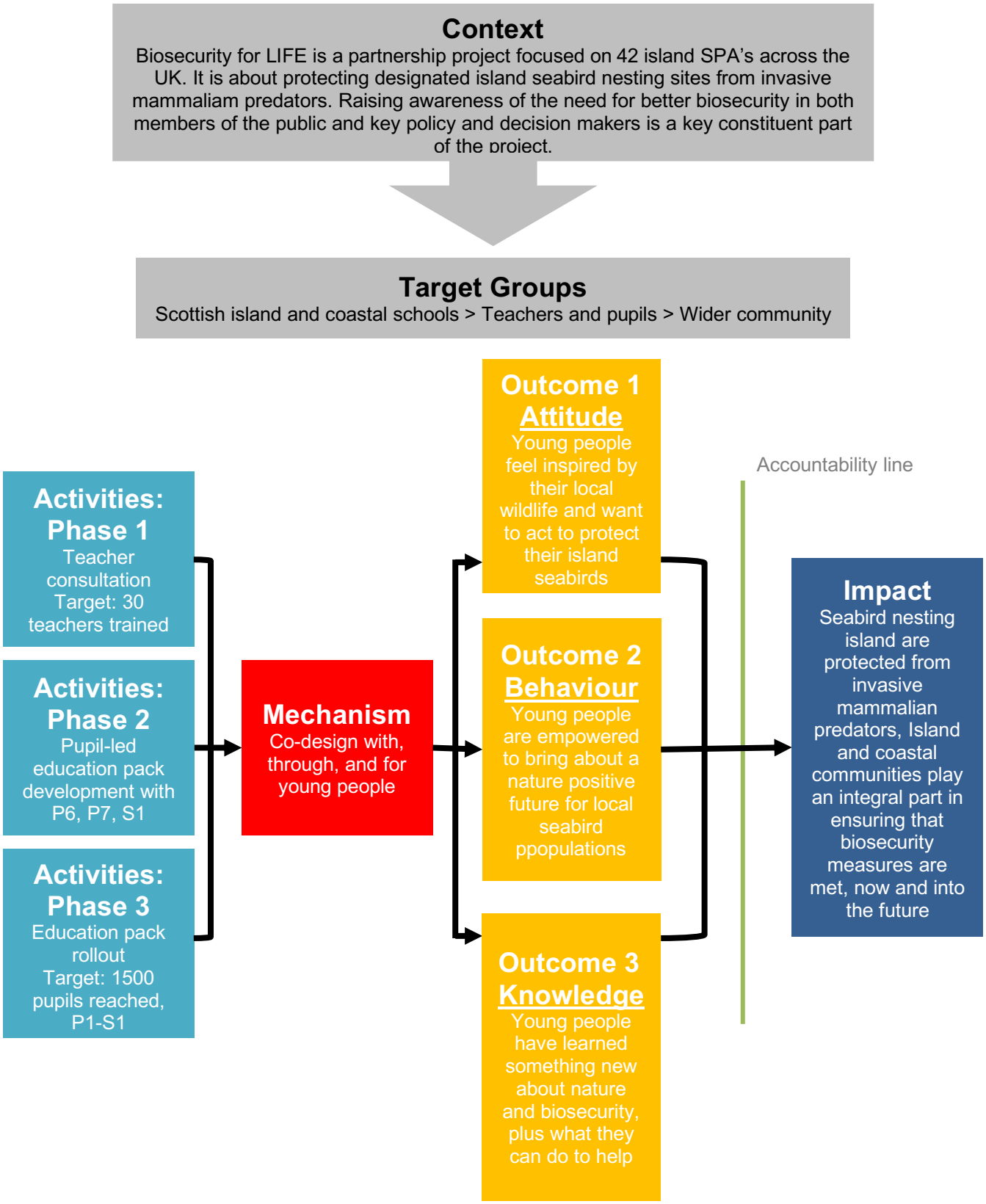

Fig. 1: a theory of change framework for the Biosecurity for LIFE education activities and outcomes. Here, we discuss phase 2 of the activities.

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This programme supports the EU LIFE Biosecurity objectives of raising youth awareness of biosecurity and protecting island biodiversity from invasive species (see figure 1, outcomes). The 106 young people involved in this process form the initial phase of Biosecurity for LIFE's target of engaging 1500 young people. Through co-design we address genuine desires from staff and pupils, building tailored resources which will serve teachers and learners better than a conventional top-down approach (Hodson et al. 2019; Gilbert et al. 2021).

Through this practice reflection, we show that co-design is an adaptable, powerful tool for covering complex and emotionally challenging topics with upper-primary-aged children. We discuss our methodology, break down the programme session-by-session, consider our evaluation data, and synthesise these steps into some conclusions. We aim to promote co-design as a conservation and education tool, documenting our delivery and hopefully inspiring others to use co-design in their own practice.

Methods

From April to June 2021, we invited schools and youth groups from island and coastal communities to a join a co-design programme. Following teacher consultation in December and January, we explored pupils' thoughts, preferences and ideas on learning and biosecurity. We worked with 106 upper-primary-aged pupils from six schools and one youth group (all referred to here as "schools" and "pupils") in five local authorities across Scotland (Table A).

Table A: The partners we worked with through this project, the number of young people attending sessions, and the local authority.

Partner	Attendance	Local Authority
Achaleven Primary School	7	Argyll & Bute
Aith Junior High School	46	Shetland
Elgol Primary School	7	Highland
North Berwick Youth Group	6	East Lothian
Raasay Primary School	6	Highland
Sgoil Bhaile a' Mhanaich	24	Na h-Eileanan Siar
Small Isles Primary School	10	Argyll & Bute

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Our programme comprised six 90-minute sessions: sessions 1, 3, and 5 led remotely by RSPB staff and 2, 4, and 6 led by teachers using RSPB resources.

1. Introduction: introduce biosecurity and the process of co-design.
2. Research: research seabirds in national and regional contexts, considering ecology, habitat, and threats.
3. Co-design: work on solutions for island biosecurity, establishing learning preferences, and developing resources to explore specific biosecurity topics.
4. Prototyping: pupils develop their resources for presentation in the next session.
5. Evaluation: pupils showcase their ideas and evaluate each others', using this evaluation to refine ideas and explain how and why they might change their idea.
6. Spread the word: pupils design communications to spread the word about biosecurity and the work they have done during this programme.

Programme Development

The programme was postponed due to the COVID-19 pandemic, leaving us additional time to develop plans that enabled remote learning. We found co-design to be resilient to the challenge of adapting from in-person to remote delivery: self-direction from pupils meant they could adjust to the new pace and circumstances of learning, and the hybrid approach (RSPB leading some sessions and providing plans for teachers for the remaining sessions) meant pupils had half of their learning in-person. We adjusted sessions throughout the delivery, usually making them more physically dynamic and with more mental downtime for pupils to compensate for the challenges of digital learning.

The immediate benefits of our co-design approach are generating high-quality, original ideas which mean something to our audience and a deeper understanding of user needs. Immediate validation of ideas leads to efficient decisionmaking and higher-quality, better differentiated engagement services. From these, we hope to see a more satisfied (and loyal) stakeholder network with improved relationships and greater support for innovation and change.

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Outcomes

Through this programme we investigated five elements with pupils which we see as crucial to biosecurity education and co-design: biosecurity language and messaging, baseline knowledge of biosecurity, development of that knowledge, learning preferences, and evaluation skills.

Session Breakdown

Session 1: Introduction

We introduced ourselves, seabirds, and biosecurity as a topic. As an icebreaker and to demonstrate the variety of seabirds, we asked pupils try to match photos of seabirds with their Gaelic, Orcadian, Shetlandic, and scientific names and invited them to name some birds themselves. These activities linked the project's broad geographic extent to coastal communities' familiarity with their own wildlife and localised nomenclature (Kendig 2020).

We started on biosecurity by assessing their baseline knowledge, then explored national and local examples. Pupils were unfamiliar with the term, but quickly worked it out with guidance. Their guesses emphasised nature and safety (with some militaristic undertones), and they soon settled on a reasonable working definition. In contrast to the teachers, there was no mention of biohazards (safety from nature), the emphasis was instead placed on our safeguarding of nature.

We asked pupils about why biosecurity matters, how they would feel about seabird loss, communicating biosecurity issues, and island biosecurity methods. Pupils highlighted the aesthetic and intrinsic values of biodiversity, as well as the role of seabirds in the wider ecosystem, showing that they understood the topic and its implications well from a conservation standpoint (Bruskotter et al. 2019). Pupils self-reported negative feelings about seabird loss and the knock-on effects through the food chain, believing that the value of conservation is self-evident if people understand the risk of extinction. Biosecurity approaches varied from current practice (checking boats and bags, rat traps) to more intensive (kill all rats, reduce or ban tourism, use cats to hunt rats) and unusual ideas (teach birds karate, genetically-modified birds with wasp stingers, lasers and force

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fields, covering islands with domes). Their responses reflected a deep understanding of the topic and its context alongside superb creativity.

Session 2: Research

Classes explored local seabird populations and threats. We provided teachers with regional guides, UK-wide seabird surveys, and guidance towards other useful information. We also shared two stories on extinction (the great auk and Stephens Island wren) with worksheets for the class. These activities were well-received, though some teachers noted that research is more challenging with a larger class. The diversity of different class's research showed the strength of pupils' interest in research given the chance (Clark et al. 2022), and some went beyond the set time and activities to produce their own posters and fact files. Teachers also welcomed the readymade worksheets that were tailored to quite a niche topic.

Session 3: Co-design

We began co-design and idea generation using prompt questions and some surveys of learning preferences. We asked about learning methods pupils were already familiar with, how they feel about them, and how they would improve them. Pupils preferred outdoor, active, and creative learning to sedentary, text-based, rote learning. Many suggested improvements to show this idea, taking activities outside ("skydiving and writing at the same time", "doing the maths in the sand"), making them more active ("pretend the numbers are like cattle and move them around"), or creative ("teacher writes stuff down and children sculpt into clay").

We asked pupils to vote on their favourite ways of learning and matched popular ways of learning with set topics to guide pupils' prototyping the following week. Outdoor activities were by far the most popular, with games and creative projects next most popular.

Session 4: Prototyping

Pupils developed prototype resources for other schools under their teachers' guidance, testing their ideas.

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Arts

Classes took on varied artistic projects, from clay modelling, drawing, dot-to-dot, paint-by-numbers, Hebridean folk melodies, and posters. Generally the activities were for developing appreciation of seabirds' form and biology, or explaining the process of biosecurity and extinction. All classes chose films as one of their favourite ways to learn; some filmed themselves acting, others used stop-motion, and one class used Scratch animation software to create a biosecurity-related cartoon and game. The films' content included direct explanations of biosecurity, stories of people travelling between islands for concerts, predators invading islands and impacting wildlife, and a comedy news bulletin. These activities translate well across age groups, composite classes, and students with additional support needs, including non-verbal pupils.

Games

Games were very popular and fell into two broad categories: board games and outdoor games. One class devised a version of rounders where batters are seabirds and fielders are predators, another used tig with cards inspired by biosecurity interventions such as rat traps, plus parachute games and others based on football, Simon Says, and treasure hunts. Two classes had some variant of snakes and ladders, and another developed a board game where players defend their islands from predators which was developed further and produced for use in schools (see Biosecurity for LIFE resources*).

Session 5: Evaluation

We explained evaluation and constructive criticism, then asked the class to showcase their ideas. After all pupils had shared their ideas and evaluated each other, we shared their feedback. We guided pupils to refine their ideas and share them again, explaining what they changed. The feedback was all constructive and in good faith; groups understood that collaboration and feedback improve ideas. Pupils responded well to the feedback from others. We emphasised that, while all the feedback is useful, it need not all be incorporated if they could explain their choices. All pupils agreed that their ideas were stronger now than before the evaluation, if only for defending them, and they were happy for us to use their ideas for further development.

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Session 6: Spread the Word

We invited pupils to create their own campaigns and communications about biosecurity. Pupils mapped stakeholders, considered dissemination methods, and matched method and audience to develop a tailored campaign strategy. They took their biosecurity messages and used them (and other marine conservation initiatives) to create posters to share with the public. Pupils reinforced their biosecurity knowledge, built communication skills, and could see tangible impact of their previous work and this self-led mini-project.

Summary of Findings

We found that young people cared about wildlife and understood biosecurity quickly. Pupils' favourite ways to learn were creative and active, with pupils and teachers thriving under the empowerment of a co-design model, developing strong critical thinking and evaluation skills. Based on pupil and teacher feedback, the resource pack must empower young people to direct their own learning and output, using varied media indoors and outside. The local specificity was also important for examples and research, alongside full Gaelic translation (or other languages as appropriate) and flexibility for composite classes.

Monitoring & Evaluation

Feedback from Pupils

We sought pupil feedback through a simple questionnaire with Likert scales and a few open questions. Scaling responses from strongly disagree (1) to strongly agree (5), the average score over the 67 forms returned was 4.2. While we acknowledge potential for aquiescence bias in this method, we believed it a worthwile trade-off for clearer communication with the pupils (Suárez Álvarez et al. 2018).

Statement	Score (out of 5)
I learned something new about nature	4.5
The programme was engaging and inspiring	4.1
I was able to share my ideas	4.2
It made me more concerned about the problems facing nature	4.3
The activities made me feel excited and amazed	3.9

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84% of pupils would recommend the programme, and responses to the open questions reflect that pupils enjoyed the process and hope to continue engaging with conservation issues. Some pupils pointed to specific favourite parts of the programme (usually co-design and creating their own content) and many enjoyed all aspects, though some disliked the digital delivery.

Feedback from Teachers

We solicited feedback from teachers after the programme, alongside informal feedback throughout. Of five responses returned, all aspects of the project were rated good (4) or excellent (5), with an average score of 4.6.

Aspect of programme	Score (out of 5)
Content of the session	4.6
Relevance to the curriculum	4.4
Ability to engage pupils	4.6
Knowledge of facilitators	4.6
Programme overall	4.8

All teachers surveyed would recommend this programme and resource pack to other educators. These teachers also appreciated the enfranchisement that comes from co-design and the excitement from their pupils.

Teachers liked the sense of empowerment they saw in their pupils and the structured creative process to help bring out the best ideas. They also appreciated the locally-specific curriculum links, unusual topic, and opportunity to link to other subjects through teacher-led sessions. The suggested improvements focused on the drawbacks of digital education, otherwise the programme was considered to be well thought-out and classes are keen to remain informed about the progress.

Teachers observed links to all four Curriculum for Excellence skills for learning, life, and work. Teachers also noted learning in at least three subject areas (covering seven of eight total), with Health and wellbeing, Sciences, and Social studies the most commonly observed. They also flagged teamwork and evaluation as additional extracurricular skills.

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Conclusion

Through this project we developed ideas and skills for teaching biosecurity within Scotland using co-design and supporting Learning for Sustainability. Teachers and pupils were happy with the process and outcomes, and we developed some brilliantly creative ideas to take forward. We realised that co-design itself was the most powerful teaching tool at our disposal, deciding to use the learning from this programme to build a teacher-led co-design programme which rolls out from August 2022 Across the UK*.

Biosecurity is a difficult topic full of complex ideas and value judgements, but using co-design we managed to navigate the topic with pupils across Scotland, supporting our conservation awareness and education objectives. Through the lens of Learning for Sustainability, co-design allowed us to meet pupils' entitlements to outdoor, sustainable development, and global citizenship education in an integrated and contextualised project (Clarke & Mcphie 2016). We hope that similar practices will become common as policy shifts towards interdisciplinary and holistic education, empowering pupils to direct their own learning, find their voice, and cover issues relevant to their own experiences.

* https://biosecurityforlife.org.uk/education

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Author contributions:

LC led the project and designed and delivered the sessions with JB. JB wrote the original report on which this manuscript is based, and adapted the report into this manuscript with oversight from LC.

Acknowledgements

We would like to thank the staff and pupils of Achaleven Primary School, Aith Junior High School, Elgol Primary School, North Berwick Youth Group, Raasay Primary School, Sgoil Bhaile a' Mhanaich, and Small Isles Primary School for their enthusiasm, openness, and contributions throughout this project. We would also like to thank Suzanne Welch and Callum McGregor for their edits to this manuscript. Finally we would like to thank Tessa Coledale, Sarah Lawrence, Holly Paget-Brown, Jaclyn

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Pearson, and Thomas Churchyard from Biosecurity for LIFE [LIFE17 GIE/UK/000572] and the funding from EU LIFE for their unending support for our work and running the project of which this programme was only one part.

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