Caring for Scotland's Temperate Rainforests

June 2024
Written by Stephanie Li

INTRODUCTION

My love for gardening was born from my love for being in natural landscapes. In these wilder places you can feel the complexity of an ecosystem, teeming with life among the wind, rain, plants, and birds. In them I have wanted to understand my place as a gardener; a desire to work *with* rather than control nature. Over the last three years studying at RBG Kew, this feeling has developed my practice in horticulture; classifying the act of gardening being an act of care. So, I have focussed my learning on understanding the different relationships plants need to survive within their habitat, encouraging me to garden with an ecological mindset and care not only for plants but also their ecosystem.

After visiting family on Vancouver island I was left captivated by a unique habitat, the temperate rainforest. Underneath the dappled light of gnarly trees coated in lichen, I noticed the crystal orbs of water droplets perched on carpets of moss draped over deadwood and rocks. There, standing in the presence of plants who stood the test of time, I was inspired to learn more. Unbeknown to me, I could study temperate rainforests closer to home. Guy Shrubsole's book "The lost rainforests of Britain" became a template for the journey I'd take on this travel scholarship.

"Doing something to repair the damage done to our own rainforests here in Britain – 'this other Eden', this 'green and pleasant land' as our greatest playwrights and poets would have it – feels like a redemptive quest. In restoring them, we might yet restore a missing part of ourselves. Because our rainforests aren't irrevocably lost." (Shrubsole, 2022)

Found on Scotland's west coast, in the hyper-oceanic zone, where levels of rainfall remain consistent and temperatures are relatively mild year-round, are some of the last remaining temperate rainforests in the UK. West coast Scotland also offers a range of sites to research which include botanic gardens, private gardens, privately-owned and protected sites. As such I have planned my trip to focus within this region. Scotland's rainforests are as important as tropical rainforests but are even rarer. These climatic conditions create a suitable home for some of the world's rarest bryophytes and lichens, which can be monitored to understand the critical threats to humanity and the environment – air pollution, climate change, and the biological diversity crisis. It's the diversity of these mosses and lichens that makes Scotland's rainforest an internationally significant ecosystem.

Temperate rainforests can be broadly defined by climate, location, species of tree and plants. Climatically they are found in places with high rainfall (between 150-500cm precipitation per year) and humidity with a low annual variation in temperature within close proximity to the sea. This rare ecosystem is made up of ancient oak, birch, ash, pine, and hazel woodland with open glades, boulders, crags, ravines and river gorges, and an understory of ferns, bryophytes and lichens.

OBJECTIVES

By attending workshops, visiting herbariums and gardens, and practising ecological fieldwork my objectives are:

- To define what characteristics determine a temperate rainforest
- To learn from experts in the field about how to identify plants, bryophytes, lichen, and wildlife that live in this special ecosystem
- To understand how these plant and wildlife communities' function together
- To discover how we can care for them and increase awareness to the public to care for them too

ITINERARY

Wednesday 29th May
Visited Glasgow Botanic Garden: Meeting with curator, Hiro Shimai, and Head Propagator, Stevie Jacusz.

Thursday 30th May
Visited Benmore Botanic Garden: Walking the moss and lichen trail. Meeting with curator Peter Baxter and RBG Edinburgh Head of Cryptogamic Plants and Fungi Section, Dr. Christopher Ellis.

Friday 31st May
Visited Inverewe garden: Meeting woodland gardener, Maddie Geddes-Barton.

Saturday 1st June
Arrived on Eilean Shona.

Sunday 2nd June
Reccie of Eilean Shona.

Monday 3rd June - Wednesday 5th June
Carried out observational ecological studies on Eilean Shona with ecologists and entomologists Nigel, Caroline, Dan & Rachael Brown.

Thursday 6th June
Visited Forestry and and Land Scotland, Garbh Eilean.

Friday 7th June
Visited Woodland Trusts' Dunollie wood.

Saturday 8th June - Sunday 9th June
Attended a lichen and bryophyte workshop delivered by Dr. Oliver Moore (Plantlife Bryophytes and Lichens Advisor) at Glenan Woods, near Portavadie, Argyll for the West Cowal Restoration Project.

Friday 14th June
Visited the NHM museum to look at their bryophyte, lichen, pteridology and seaweed collections with their lead curators: Jo Wilbraham, Alison Paul and Gothamie Weerakoon.

GLASGOW BOTANIC GARDEN
TOUR WITH HEAD PROPAGATOR STEVIE JACUSZ

We used the opportunity of arriving in Glasgow to visit the city's botanic garden. Curator Hiro Shimai and Head Propagator Stevie Jacusz gave us a tour of their display glasshouses and behind the scenes in their nurseries. Being a council-run garden has not deterred Stevie's enthusiasm for his job as showcased by his resourceful experimental propagation techniques. Recycled 1L plastic bottles of fizzy drinks made snug-fit vented prop lids for 9cm pots, while shallow water troughs underneath potting benches served multiple functions - increasing humidity in the nursery, growing aquatic plants for the display ponds and housing terrapins who help eat pests. But it was the filmy fern house that stood out. Closed to the public to ensure the safety of the collection, a small glasshouse drips in ferns and mosses. Prized endemics to New Zealand like a 150-year-old *Leptopteris superba,* and a filmy fern *Hymenophyllum dilaiatum.* Filmy ferns are found in temperate rainforest environments, three of which are found in the UK all of which have been threatened by habitat loss and over-collection. So, it was special to meet our first one of the trip, *Trichomanes speciosum*.

Figure 1 Hiro and Stevie in the filmy fern house
Figure 2 Trichomanes speciosum detail in Glasgow BG filmy fern house (photo credit: Fay Davies)

BENMORE BOTANIC GARDEN
MOSS AND LICHEN TRAIL

The first west coast Scotland site we visited was Benmore Botanic Garden. Set within the mountainside are two self-guided trails designed for the public to engage with 20 species of lichen and moss found within the 120-acre garden. Visitors are given an easy-to-read booklet to keep and a hand lens to return at the information desk upon request. The pocket-sized booklets briefly describe what each organism is, including a map of the trail, and an interesting tidbit for each species encountered. Equipped with our hand-lenses we went in search of these unique organisms, taking in much of the iconic points in the garden while dipping our toes into identifying species. These trails engage the public in a fun, inclusive and educational way, while successfully raising the profile and value these organisms have within Scotland temperate rainforests.

The curator Peter Baxter introduced us to Dr Christopher Ellis and Dr Rebecca Yahr from RBG Edinburgh, two lichenologists who were there continuing their research in the ex-situ conservation of lichen. We chatted briefly about their work to harness RBGE's three regional botanic gardens as experimental sites to understand the responses of rainforest species to climate change.

The three botanic gardens, Logan, Dawyck and Benmore, offer different climates for monitoring the growth rates of rainforest lichen. These are wet and warm, dry, and cool and wet and cool respectively. Taking monthly measurements under the varied combinations of temperature, rainfall and light across the sites, the scientists can estimate the effects of future climate change, including the health of lichen populations in Scotland's temperate rainforests over the next decades. This research has affected the management of their woodlands, where they hope to increase their complexities by diversifying species, ages and structures of trees that can create a wider variety of microclimates to help lichens colonise and survive.

Pseudocyphellaria intricata, a rare foliose lichen which has a brown thallus when moist that becomes grey, brown on drying, is also undergoing an experiment. The scientists pointed out their novel approach to increasing their populations by translocating them onto hazel, *Corylus avellana*, using fish wire and string on sphagnum moss. Hazel is one of the many British native trees like elm, rowan and ash that have a neutral bark, a pH preference that lichen requires for healthy growth. The site of the translation is specific, mimicking the altitude, aspect, and moisture levels (near rivers) of the lichen where it is found naturally. By translocating *Pseudocyphellaria intricata* within the botanic gardens, the population of this globally rare lichen has been given a new lease on life under protection.

Figure 3 Translocation of Pseudocyphellaria intricate on Corylus avellana in Benmore BG
Figure 4 Example of interpretation of lichen trail sign
Figure 5 Fay looking at the lichen species Chrysothrix flavovirens through a hand lens

INVEREWE GARDEN
LICHENS WITH GARDENER MADDIE GEDDES-BARTON

After a long drive we arrived at one of the most northerly gardens in Scotland, Inverewe. Surrounded by ancient Caledonian pine forests, an unassuming garden sits by the water's edge where seemingly impossible exotic plants grow happily against a cool-looking Scottish mountain backdrop thanks to the North Atlantic current. We met with gardener Maddie Geddes-Barton, who spent the day sharing her knowledge of the local lichens and her perspective on protecting them in gardens.

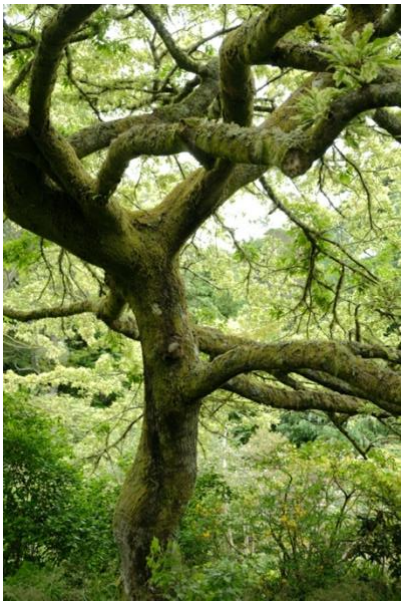
Our first point of call was to a Manna Ash, *Fraxinus ornus,* in the car park where *Collema furfuraceum*, *Usnea* and *Gabura fascicularis* are found populating the bark. As we examined the features of these lichen species, Maddie described what makes a lichen a lichen. A lichen is a composite organism made up of algae or cyanobacteria living symbiotically among filaments of multiple fungi species, along with yeasts and bacteria embedded in the cortex or "skin", in a mutualistic relationship that make up a lichen. The algae functions to get nutrients through photosynthesis, and the fungi protects the algae from drying out. Lichen can be found on the ground, trees and rocks and Maddie showed us species for each environment.

Meandering through the woodland garden we paused in awe at a large *Magnolia campbellii* planted in 1900. *Magnolia campbellii* is native to the Himalayas, but here it stood draped in *Leptogium burgessii* and *Pannaria rubiginosa.* Maddie started to describe excitedly how fast-growing non-native tree species like this could act as an alternative interim host to native lichens compared to slow-growing natives like the Ash. Lichen's primarily reproduce asexually through specialized structures called "soredia" or "isidia". These are small clusters of both the fungal and algal components of the lichen that can break off and disperse by wind. While the fungal component can produce spores through sexual reproduction, these spores need to encounter a suitable algal partner to form a new lichen, making this method less reliable. As such lichen spreads slowly and populations take a long time to build up. So while we see the drastic loss of Elm and Ash in the UK due to fungal disease, Maddie explained blue sky thinking is needed to protect the biodiversity of our woodlands. While she wouldn't

advocate for *any* non-native tree species to be planted in native woodlands, we could consider species whose characteristics lend itself to adding value rather than taking. *Magnolia campbellii* is quick growing but doesn't spread quickly, reducing its risk of being invasive. With its wide-open canopy, light filters through a structure of horizontal bows which create the ideal habitat for mosses and lichen to grow. Other examples we saw included *Leptospermum grandiflorum*, a mountain tea tree from Tasmania, dressed with *Parmeliella parvula* and *Nephroma laevigatum,* and *Quercus cerris* 'Variegata', a Turkey oak whose variegated leaves allow more light into the canopy while retaining humidity.

Figure 6 Magnolia Campbellii covered in multiple different species of lichen in Inverewe garden (above)
Figure 7 Quercus cerris 'Variegata'with epiphytic ferns and lichen growing under its dappled canopy (below)

On one tree you can find different communities of lichen, starting with early successions at the tip of a branch and later successions preferring more humidity as you get closer to the trunk. While many people presume lichen growth is detrimental to tree health, it could not be further from the truth. Lichen are not parasitic, so do not take nutrients away from their host. Instead, they are known as pioneer species in primary succession, initiating life in harsh environments by breaking down rocks to create soil, providing food and shelter for creatures, and fixing atmospheric nitrogen. They are vital bioindicators of air quality due to their sensitivity to pollutants, so where lichens are abundant so is clean air.



Our time with Maddie made it clear how garden management can aid in conserving our native lichen. Simple acts like leaving dead wood and cutting back Rodgersia, all provide niches where they can find opportunities to populate. Despite the 75,000 visitor footfall in summer, she hopes to set up a lichen trail to communicate the importance of lichen in ecosystems while aiming to avoid disturbing rarer species populations in the garden.

EILEAN SHONA
ECOLOGICAL RECORDING WITH THE BROWNS

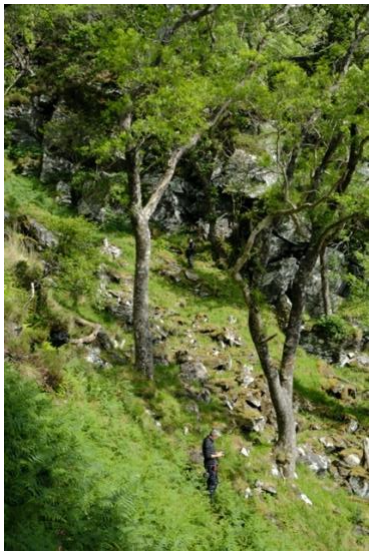



Figure 8 Nigel and Dan Brown scaling hillside woodland and ravines on Eilean Shona
Figure 9 The Browns exploring different environmental niches on Eilean Shona (Photo credit: Fay Davies)

Eilean Shona is a 1,300 acre tidal island on the west coast of Scotland. It is privately owned, with a small population of 4 people living on the island year-round, 2 of which are dear friends. For 8 months of the year the 8 cottages on Eilean Shona provide luxury tourism for a maximum of 30 people at a time making it a place with a much lower footfall than the other gardens visited. In March 2023, I visited my friends and was told of a temperate rainforest that existed there. So excitedly we walked to it, but with my limited knowledge of this ecosystem at the time I questioned, “could it really be a temperate rainforest?”. There are no official plant records on the island, aside from a few species recorded by the British Bryology Society, but there are historical signs of botanical appreciation. A tree trail has been made around previous island owner Captain Swinburne’s pines brought back from his travels. Among these are *Tsuga dumosa* and *Abies grandis*.

The ‘Lost Rainforests of Britain’ map created by Guy Shrubsole and Dr. Christopher Ellis indicates Eilean Shona is situated in a hyper-oceanic climate, i.e., a rainforest zone, with rainforest fragments. So, I invited Nigel, Caroline, Dan and Rachael Brown - a family of expert ecologists and entomologists, to carry out an ecological observation of the island over 4 days. This offered a unique learning opportunity to identify indicator species of temperate rainforests, better understand the links between habitat and species distribution, while gathering data that could stimulate more work around conservation and restoration of these precious ecosystems for the private island owner.

“Smidged” up with binoculars, hand lenses, notepads, maps, and a vasculum (a metal container to store viable flora samples while out in the field) in tow, we set off recording flora, birds and butterflies by monad. Monads are a 1 km x 1 km square that make up a grid system “monad map”. It is a standardized method to record and analyse plant species distribution within a specific region at a consistent scale across a large area. We surveyed 8 monads in total across Eilean Shona and Shona Beag, covering heathland, damp grassland, woodland, and coastland. Having never carried out an ecological survey before, it was overwhelming being submerged into a chorus of botanical names being sung by each ecologist. Harmonies changed continuously before one could even catch sight of what was being noticed. But what stood out over time were noticing the communities of flora you would find neighbouring each other in their environmental niches, and the stories that connect the pollinators and wildlife found living amongst them.

Nigel pointed us in the direction of the ‘National vegetation classification (NVC) field guide to woodland’ (2004) to guide our identification of the habitat types on the island. Since its development in the 1980s, the NVC has become the standardised method to categorise different types of forest by the dominant tree species and associated plant life present in each community. From this, ecologists and woodland managers can create a detailed ecological analysis and management strategies. As we recorded, we identified plant species that fit into two categories, W11 (*Quercus petraea – Betula pubescens – Oxalis acetosella* woodland) and W17 (*Quercus*

petraea – Betula pubescens – Dicranum majus woodland). These two categories are associated with determining temperate rainforests.

While we did not record bryophytes and lichen, we did observe an abundance of *Lobaria pulmonaria* on trees and the ground near our accommodation. Tree lungwort, as it is commonly called, is a key indicator of ancient woodland and is found along the west coast of Scotland. Due to its decline across Europe and lowland areas it is considered rare and endangered with the main causal factors being habitat loss and its sensitivity to air pollution. While this particular lichen is not mentioned in the NVC classification, it is noted in Ben and Alison Averis's document "Drizzle, Midges, Misery and Moss – a document about British and Irish rainforests".

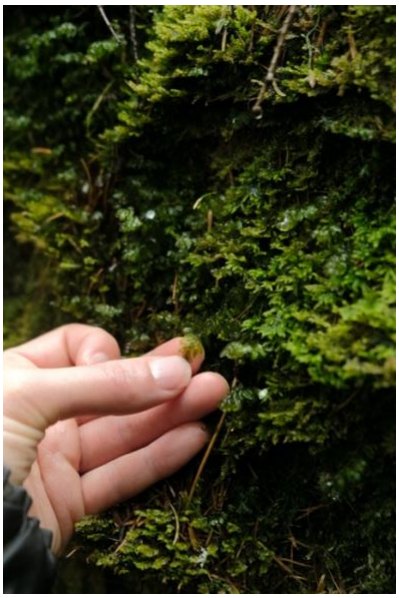


Figure 10 Checkered skipper, Carterocephalus palaemon, on Eilean Shona
Figure 11 Wilson's fern, Hymenophyllum wilsonii, on Eilean Shona
Figure 12 Tree lungwort, Lobaria pulmonaria, on Eilean Shona

As the ecologists scaled the ravines scanning the different environmental niches, suddenly Dan Brown yelled "Checkered skipper!" and with hurried excitement we went to see what he found. A small butterfly, *Carterocephalus palaemon*, fluttered along the damp grassland. The Browns told us how its main food plant in Scotland is Purple Moor-grass (*Molinia caerulea*), which we were surrounded by and that it had died out from England in 1976 but was reintroduced from continental Europe. The checkered skipper is protected under the Nature Conservation Act in Scotland, and a high priority for butterfly conservation. Given its conservation status, Eilean shona could consider applying for Site of Special Scientific Interest (SSSI), a formal conservation designation that describes an area of interest to science due to rare species of flora, fauna, or species dependent on them.

Among the 250 flora taxa recorded, Nigel was happy to see *Dryopteris aemula,* hay scented buckler fern, with light green fronds that smell of hay and a distinctive long purple stipe. He had noted this species in his own backyard temperate rainforest in Wales, but in more abundance on the island. As well as flora taxa, the Browns recorded 53 species of bird, which includes a nesting pair of white-tailed eagles, and 7 species of butterfly. It was evident this island had habitats worth protecting and wildlife dependent on them. The data was uploaded to the BSBI for contribution to future studies and shared with the owner of the island in the hope that this data will stimulate more work around conservation and restoration of these precious ecosystems.

DUNOLLIE WOOD
EXPLORING WITH TIA FILES AND RUBY

We stopped at the Woodland Trusts Dunollie Wood, a small, protected piece of rainforest which sits on the edge of Oban, before we drove back to Argyll and Bute to end our trip. After 5 days on Eilean Shona, it was a reassuring feeling to be greeted with the usual culprits bracken, nettle, dock, purple moor grass, holly, pignut and after a short steep climb be under the canopy of Ash, Rowan, Birch, Oak and majestic witch elms. I was fortunate to have met Woodland Trust volunteer Tia Files and her dog Ruby out on their daily walk, who generously fed me

information of how biodiverse the 79 acres are. They have recorded common, Soprano and Brown long eared pipistrelles, tawny owl nests, pine martens, slow worms, and red squirrels. But what she got most animated about was Hazel gloves fungus, *Hypocreopsis rhododendri,* a globally rare and threatened species found exclusively in temperate rainforest. Tia continued to explain it is not parasitic of the host tree, but actually of another fungus, the glue crust fungus, *Hymenochaete corrugata.*

The glue crust fungus spreads from one tree to another by gluing together twigs or small branches that are in contact. It then feeds off the decaying wood beneath its gluey pads. While glue crust fungus is commonly found across Britain, Hazel gloves fungus is not and is a priority species on the UK Biodiversity Action Plan and Scottish Biodiversity List. Its presence in a wood is a clear indicator of good air quality and Atlantic rainforest conditions, making it an indicator species for this habitat. Tia lives locally and has walked these woods her whole life. We spoke about the threats to this wood, which in her mind is lack of education. A recent fire in the woods started by kids are rare occurrences where the public cause damage. I left feeling inspired and reassured by the motivation, pride, and sense of belonging to understanding and caring for a place that has been a constant backdrop to her life. Tia continues to volunteer and train in ecological recording with the guidance of the woodland trust.

Figure 13 Glue crust fungus, Hymenochaete corrugate on Corylus avellana in Dunollie wood

PLANTLIFE BROPHYTE AND LICHEN WORKSHOP
WITH DR. OLIVER MOORE IN PORTAVADIE

While it would've been preferable to start our venture with the Plantlife introduction to identifying bryophytes and lichen workshop, we nevertheless ended our time in Scotland with a taster to come back for more. We spent two days with Dr. Oliver Moore, bryologist, and lichenologist on free field workshops in Portavadie, Argyll and Bute, for woodland managers, landowners, and gardeners. Oliver shared 4 field guides with us to aid in our learning to identify bryophytes of Atlantic woodlands in ravines and woodlands, and lichens on birch, alder, oak, ash, hazel, willow, rowan, and old oak. We learnt the key identifying features for identifying mosses, liverworts and lichens which included colour, shape, growth forms, capsules, cillia (black hairs on the upper surface of lichen), soredia (floury powder or coarse granules that are involved in lichen vegetative reproduction) and even taste.

A true storyteller, he then enveloped us into a world where these small and seemingly inanimate organisms vividly come to life. What was most intriguing was his commentary on conservation. He described the IUCN does not classify a species endangered if the country has 10% or more of the global population, so while a lichen can be locally frequent, it can in fact be globally rare. Oliver asked us to consider whether what should be conserved in spite of these classifications. His philosophy was refreshing, as we had learnt from other people who have spent a lot of their time and life observing nature unfold. In the case with moss, we learnt how recently introduced beavers in Scotland have been felling aspen trees and eating them. The rare aspen bristle moss, *Orthotrichum gymnostomum*, depends on these trees. So, while the beavers have won the hearts of the public with their reintroduction aided by their fluffy engineering character creating dams encouraging a different kind of biodiversity, Oliver asks us to question the rights of all beings, the communities of life that exist on the dying trees which includes the lichen and mosses.

As we encountered trees with 40 different species of lichen on, we learnt that there are 40 indicator species of lichen for highland woodland of which you have to find 15 to be able to classify it as a temperate rainforest, and 50 lowland lichen species of which you have to find 25 to classify. We talked about solutions for the fungal diseases decimating native ash and elm trees across the country. Like Maddie from Inverewe, Oliver was full of

modern ideas. He suggested growing trees which have veteran features, so despite them being young, as long as they can create different lignin habitats then there is hope for lichen to grow on them. And that aspen would also be a suitable native replacement for ash as it doesn't regenerate in a way that causes too much shade in the forest, allowing light through for lichen and moss to grow. What is essential though for any new woodland is to take into account the proximity of refugia to enable species movement and allow for quick ecological continuity. This is significant for lichen and moss in particular, whose reproduction and growth is slow compared to the rate at which we destroy and create.

We lost count of how many lichen and moss we identified across the two days. Oliver left us full on latin names. He also helpfully suggested Plantlife's Rapid Rainforest Assessment, a cheat sheet of sorts to help the public quickly identify whether they have encountered a temperate rainforest. I kicked myself that I hadn't stumbled upon this sooner and taken it to Eilean shona. But as I looked at the list of indicator species there was the Hay-scented buckler fern, *Dryopteris aemula,* and tree lungwort, *Lobaria pulmonaria,* and an affirmation that we found a temperate rainforest.



Figure 14 Dr. Oliver Moore teaching how to identify lichens in Portavadie
Figure 15 Orchrolehia tartarea, a cudbear lichen, identified during the workshop (photo credit: Fay Davies)
Figure 16 Examining the identifying features of a lichen through a hand lens during the workshop (photo credit: Fay Davies)

CONCLUSION

Objectives:

- *To define what characteristics determine a temperate rainforest*
- *To learn from experts in the field about how to identify plants, bryophytes, lichen and wildlife that live in this special ecosystem*
- *To understand how these plant and wildlife communities function together*

There are many books and websites which can help a novice define the characteristics of what make a temperate rainforest. I have referred to a few of these in my bibliography. But for a novice to know whether they're in a temperate rainforest requires expert botanists and ecologists. One such expert is Dr. Oliver Moore, whose workshops hosted by Plantlife introduced us to identifying the key indicator species, bryophytes, and lichens. With laminated field guides showing 10 species of each that can be found in woodlands, rainforests, and specific trees such as birch, alder, and oak, we got an insight into the practice of identifying and attempted to grasp at the terminology used to describe species. A fortuitous opportunity to spend a few days with Mr. Nigel Brown (former Curator of Treborth Botanic Garden) and his family of ecologists and entomologists on Eilean Shona was overwhelming. He communicated the breadth and depth of why a specific plant species will have adapted to grow in its location based on geology, climate, and other conditions to find its environmental niche supported by life otherwise unseen builds a beautiful but complex tapestry of a habitat and how all living things are connected. With the large amount of official data recorded by Nigel and his family, there is now a reason to apply for SSSI on Eilean Shona, with the recording of the Checkered Skipper. Verifying the woodlands as W11 and W17 by the National Vegetation Classification, will help the landowners consider how to manage them going forwards. Nigel also submitted the flora, butterfly and bird records taken to the BSBI to be of continued use for on-going research into the flora and fauna of Britain.

- *To discover how we can care for them and increase awareness to the public to care for them too*

These free field workshops provided by Plantlife are attended by woodland managers, head gardeners and landowners who are keen to learn how to care for temperate rainforests from experts like Dr. Oliver Moore. Not only do participants leave with motivation and knowledge of how to identify what to conserve, but also a network of like-minded individuals who can share resources and experiences of species encountered and management techniques tried. Time spent in Benmore BG, Inverewe garden and Dunollie wood highlighted the active work gardeners, scientists, volunteers, and curators are doing to increase awareness to the public to care for them. The creation of trails is a simple but effective technique in educating the public on what is already there. Simple focussed messages on what the key species are and why they are important are digestible and made fun through clear interpretation signage, keepsake maps and a hand lens. The organised accessibility to learn and combined efforts of all these people persuade the local community that temperate rainforests are an invaluable asset.

In conclusion, the enchantment began as it does for most, with the verdant moss and liverworts and peculiar frills of lichen sheltered in ancient forests, but it has only deepened because of the generosity shown by the people that care for it. Their relationship to and understanding of this unique habitat and the species that live among it is infectious. Spending time with the people I have met on this trip has made me realise that whether you are new to learning or an expert in identifying, it is the dedicated practice and passion for sharing knowledge, experimentation and ideas that will conserve the temperate rainforest. It is the care of people that will determine the future of these species. I hope to embody this kind of being in my daily horticultural practice.

FUTURE PLANS

While I believe the funding has given Fay and I an invaluable insight into the process of recording ecological data and learning how to identify temperate rainforest indicator species, it is clear that continued practice of this is necessary to become of more use when carrying out such work. In lieu of that expertise, it would be valuable to have local bryologists and lichenologists record their findings on Eilean Shona to further verify indicator species and build the case for conservation and careful management of the land. I would recommend Edinburgh based botanists Ben and Alison Averis, who have written extensively on Britain's temperate rainforests for future consideration.

ACKNOWLEDGEMENTS

Thank you to my colleague Bryony Langley for putting me in touch with Curator of Glasgow Botanic Garden Hiro Shimai and Head Propagator Stevie Jacusz, and to them for taking the time to give us an insightful tour of their collection. Thank you to the curator of Benmore Botanic Garden, Peter Baxter for his warm welcome and tour of the redwoods and for connecting us with Dr. Christopher Ellis and Dr Rebecca Yahr, who I'd also like to thank for their grace and generosity to share with us their research into temperate rainforest lichens. Thank you to Maddie Geddes-Barton from Inverewe garden for delighting us with the lichen she's caring for while heavily pregnant, and to Kevin Ball from Inverewe Garden for connecting us. Thanks to Janaka Balasuriya for opening his home to us while we stayed in this special part of Scotland. Thank you to Tia Files for stopping to talk to me and sharing her knowledge so generously in Dunollie Woods. Thank you to Dr. Oliver Moore from Plantlife for imparting his infectious adoration and storytelling on lichens and bryophytes during our weekend in Portavadie. Thank you to Vanessa Branson for permissions to survey Eilean Shona and to Boe and Ali for making it all happen, and ensuring our stay on the island was more than comfortable.

Special thanks to Nigel, Caroline, Dan & Rachael Brown for their ability to answer all our questions and bestow an abundance of stories of plants, rocks, moths, butterflies, birds and insects in a fun, informative and humbling way. It is an honour to have had access to your knowledge during our time spent surveying Eilean Shona together. Thank you particularly to Nigel for taking the time to submit the 250 flora taxa, 53 bird species, and 7 butterfly species to BSBI and providing his expert recommendations for managing conservation on the island.

Thank you to the RHS, the Merlin Trust and the Kew Guild whose generosity of funding enabled this trip to go ahead. This funded learning has inspired me with the invaluable perspectives encountered by the people and precious temperate rainforests we met.

And lastly a very special thanks to Fay Davies, whose botanical curiosity and companionship continue to steer me to become a better gardener.

FINAL BUDGET BREAKDOWN

Funding Body	**Funding Received**
The RHS	£1500
Merlin Trust	£1250
Kew Guild	£1000
Total	**£3750**

Expenses	**Cost**
Accommodation	Glasgow: £100/night Inverewe: £0 Eilean Shona: £250/night Oban: £100/night Portavadie: £150/night **Total: £1750**
Travel inc. flights, trains, buses and taxis	Train: London → Glasgow: £95 Train: Glasgow → London £300 (sleeper) Ferries: £60 Car: £650 Petrol: £200 **Total: £1305**
Food	£30/day x 12 days= £360 each **Total: £720**
Insurance	**Total: £100**
Total Expenses	**£3875**

REFERENCES

Books:

Shrubsole, G. (2022). The Lost Rainforests of Britain. HarperCollins UK.

Websites:

Averis, B. (2023). A Provisional Definition of Temperate Rainforest in Britain and Ireland. [online] Available at: http://www.benandalisonaveris.co.uk/wp/wp-content/uploads/2023/07/A-Provisional-Definition-of-Temperate-Rainforest-in-Britain-and-Ireland-Ben-Averis-2023-13-07-2023.pdf [Accessed 18 Dec. 2024].

Averis, B. (n.d.). DRIZZLE, MIDGES and MOSS Welcome to the rainforests of Britain and Ireland! [online] Available at: http://www.benandalisonaveris.co.uk/wp/wp-content/uploads/2020/11/rainforests_-_ben_averis_-_june_2020__version_with_images_at_low_resolution_.pdf [Accessed 11 Dec. 2024].

britishlichensociety.org.uk. (n.d.). Lobaria pulmonaria | The British Lichen Society. [online] Available at: https://britishlichensociety.org.uk/resources/species-accounts/lobaria-pulmonaria. [Accessed 19 Dec. 2024].

butterfly-conservation.org. (n.d.). Chequered Skipper. [online] Available at: https://butterfly-conservation.org/butterflies/chequered-skipper. [Accessed 19 Dec. 2024].

Cottam, L. (2019). SSSI definition: what is it and what does it mean for conservation and development? [online] Woodlandtrust.org.uk. Available at: https://www.woodlandtrust.org.uk/blog/2019/03/sssi-definition/. [Accessed 19 Dec. 2024].

Exploring, conserving and explaining the world of plants for a better future. (n.d.). Available at: https://www.rbge.org.uk/media/8906/impact-of-the-royal-botanic-garden-edinburgh.pdf. [Accessed 4 Dec. 2024].

Find out if woodland condition is beneficial for rainforest lichens, mosses and liverworts, and identify issues to inform management Rapid Rainforest Assessment. (n.d.). Available at: https://www.plantlife.org.uk/wp-content/uploads/2023/03/Rapid-Rainforest-Assessment-GUIDANCE-1.pdf [Accessed 18 Dec. 2024].

Guy (2021). Resources for identifying temperate rainforests. [online] Lost Rainforests of Britain. Available at: https://lostrainforestsofbritain.org/2021/05/07/resources-for-identifying-temperate-rainforests/. [Accessed 11 Dec. 2024].

Hall, J.E., Kirby, K.J. and Whitbread, A.M. (2004). NATIONAL VEGETATION CLASSIFICATION Field Guide to Woodland. [online] Available at: https://data.jncc.gov.uk/data/673dc337-e58f-4f6b-ac7b-717001983c2e/JNCC-NVC-FieldGuideWoodland-2004.pdf. [Accessed 11 Dec. 2024].

Jncc.gov.uk. (2019). National vegetation classification field guide to woodland | JNCC Resource Hub. [online] Available at: https://hub.jncc.gov.uk/assets/673dc337-e58f-4f6b-ac7b-717001983c2e. [Accessed 11 Dec. 2024].

plantatlas2020.org. (n.d.). PlantAtlas. [online] Available at: https://plantatlas2020.org/atlas/2cd4p9h.c3. [Accessed 27 Nov. 2024].

Pressreader.com. (2024). PressReader.com - Digital Newspaper & Magazine Subscriptions. [online] Available at: https://www.pressreader.com/uk/the-scotsman/20181003/282003263365191?srsltid=AfmBOorWNKuVUrRxc6Z61KpxbZoYNcFRy_u4P_xXdpaPZnZHMmRqQ6hr [Accessed 4 Dec. 2024].

Trust, W. (2021). [online] Woodland Trust. Available at: https://www.woodlandtrust.org.uk/visiting-woods/woods/dunollie-wood/ [Accessed 18 Dec. 2024].

Trust, W. (n.d.). Hazel Gloves Fungus (Hypocreopsis rhododendri). [online] Woodland Trust. Available at: https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/fungi-and-lichens/hazel-gloves-fungus/. [Accessed 17 Dec. 2024].