

A photograph of a dense, moss-covered forest in Bhutan. The scene is dominated by large, gnarled trees with thick, mossy branches that arch over the path. The forest floor is lush with various plants, including large-leafed shrubs and smaller flowering plants with bright red blossoms. The background shows a misty, mountainous landscape with more trees and a soft, overcast sky. The overall atmosphere is serene and natural.

**Community and Conservation
in the Kingdom of Bhutan**

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Introduction

Enclosed in the Eastern Himalayas, Bhutan is a small kingdom nestled between China and India. With an area of 38,394 km², Bhutan is almost entirely mountainous with its highest peak reaching more than 7000 meters. With a massive range, this has allowed for a diverse range of habitats for flora and fauna which can be divided into three broad physiographic zones. The Southern Zone made up of the Himalayan foothills adjacent to low-lying areas of India, the Inner Himalayas consisting of river valleys and rugged terrain and the Greater Himalayas in the north consisting of alpine meadows, high altitude wetlands, glacial lakes and snow-clad mountains. Considered a biodiversity hotspot, Bhutan boasts over 5,500 species of vascular plants, 770 species of birds and over 200 species of mammals with new species being discovered today.

Despite its small size, Bhutan maintains a large commitment to conservation and is considered a model for proactive conservation according to the International Union for Conservation of Nature. In 2008, the Constitution of Bhutan enacted that it was to uphold a minimum of national forest coverage of 60% in perpetuity. As a result, almost 70% of the land is under forest cover and 60% is protected as national parks and reserves, 9% of that are biological corridors that connect the areas. With its immense coverage of forest, Bhutan is currently net negative in greenhouse gas emissions.

Amongst those protected areas include the second largest, Jigme National Park which has an altitude range of as low as 1500 m to 6500 m meaning it has one of the most diverse ranges within its area. Some species you can expect to find in Jigme National Park include *Betula utilis*, *Sorbus* spp., *Rhododendron* spp. *Abies densa*, *Carex nivialis*, *Quercus glauca*, *Primula* spp, *Meconopsis grandis*.

At the heart of Bhutan's culture is Bhutan's Gross National Happiness philosophy that sees conservation of the environment as one of the four pillars. Nearly 56% of the Bhutanese are involved in agriculture, forestry or conservation with its main difference to other countries being that its protected areas are inhabited by local people. Programs are deeply considered for the locals that live within the protected areas and the Royal Government of Bhutan actively promote community-based conservation. For example, in 1990, Bhutan initiated a community forest program to increase community participation. The program enables the traditional users of a national forest to apply for legal rights to manage a block of national forest and form their own management group named the Community Forestry Management Group.

Prior to 1974, Bhutan was a relatively quiet and hidden country although many old accounts can attest to flora contained within from the likes of Joseph Dalton Hooker or Roland Edgar Cooper. Despite opening their doors to the world, they still maintain regimented entry requirements in order to preserve natural resources and to not burden society with the perils of tourism. As such, tourism fees go back into offsetting the carbon footprint of visitors through planting trees, upskilling workers in tourism and cleaning and maintaining hiking trails.

The project will involve a 5-day working week at the Royal Botanical Garden, Serbithang, where we will help with the installation of their annual flower festival as well as gain some experience in micro-propagation of native orchids, their native tree seed conservation project and general horticultural practice. The remaining time will be spent hiking in Jigme Dorji National Park to observe the diverse flora throughout the different habitats.

Aims & Objectives

1. Learn about the Royal Botanical Garden, Serbithang and gain a deeper understanding about their conservation programmes:

- Spend a 5-day working week at the Royal Botanical Garden, Serbithang, to meet with Pem Zem and Natural Biodiversity team at the botanical garden in Thimphu.
- Observe and participate in the tree seed conservation project and the micropropagation of threatened orchids.
- Help with the installation of their annual flower festival and general horticulture practice.
- Visit and discuss the management of the botanical garden, including interpretation.

- Continue the valuable and existing relationship between the Royal Botanical Garden and Royal Botanical Gardens, Kew.

2. Experience and observe the diverse flora (particularly woodland and alpine) of Bhutan:

- Observe the diverse flora throughout different habitats and altitudes, culminating in a multiday hike through Jigme Dorji National Park.
- Observe how these plants grow in their natural habitat, and the relationship between plant communities.
- Visit Lamperi Royal Botanical Park for its Rhododendron collection.
- To look out for endemic species of Bhutan.

3. Observe how the increasingly threatened flora of Bhutan is handling climate change and in turn may inform our future approach to ornamental horticulture and choice of plants in the face of UK climate change:

- See plants in their native surroundings to gain a deeper understanding of the plant's ranges and adaptability in an extreme environment.
- Understand how we might be able to look after Bhutanese flora better in ex situ conservation and in cultivation.

4. Develop botanising skills and gain experience in the field:

- Using books, keys, guides, and local knowledge to support and develop identification skills.
- Keying out plants.
- Visit areas that have botanic records to test knowledge.
- Visit herbarium to familiarise self with local plants.

5. Learn how the Bhutanese people depend on the mountains and the plants for their livelihoods and culture:

- Learn more about people's relationship with the land in Bhutan and how intrinsic it is to their overall wellbeing.
- Include a visit to a Community Forest to gain an insight into one of Bhutan's conservation programmes and how they run the program.
- Visit Sorig museum, Bhutan's museum for traditional medicine to learn more about how plants are used in the country.

Itinerary of Locations visited.

Date	Location
Sunday 23 rd April	Paro Taktsang (Tiger's Nest) Monastery
Saturday 24 th April	Lamperi, Royal Botanical Park and Sorig Museum
Tuesday 25 th April – Thursday 27 th April	Royal Botanical Garden, Serbithang
Friday 28 th April	Lungchutse trail, Dochu La Pass
Saturday 29 th April	Jungshi handmade paper factory
Sunday 30 th April – Sunday 7 th May	Jigme Dorji National Park

Work programme

Week 1 by Zoe

Day 1 – Sunday 23rd April - Hike to Paro Takstang Monastery.

As birthplace to Buddhism in Bhutan, Paro Takstang Monastery (3120m) has significant cultural history for the Bhutanese people and those that follow Buddhism. It is one of the most recognised images associated with Bhutan; a monastery set aside a steep mountainside, mysterious and ethereal, defying gravity as it sits, as if grown from the mountain itself. Takstang Monastery is one of – if not the most - popular to places to visit in Bhutan, it draws pilgrims, monks, and visitors from all over the world as well as Bhutan. Un-acclimatised (and off the back of our flight to Bhutan!) we were passed by a group of young Bhutanese monks making their way up the monastery. Although a top tourist attraction it is also still a working monastery.

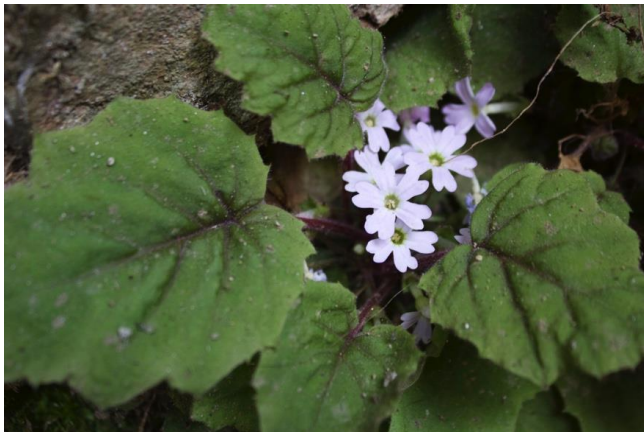


Left: View of Takstang Monastery, right: Fern and lichen covering trees

A steep climb up through woodland gave us a glimpse of the verdant forest that surrounded the monastery. As we walked higher and higher, the views grew and still nothing interrupted the expanse of forest around us, except that is for the fluttering prayer flags, strung between trees and guiding us up along the path. On our way up we passed *Euphorbia griffithi*, *Populus rotundifolia*, *Quercus semecarpifolia* and *Pinus Wallichiana* and our first *Rhododendrons*! Interspersed throughout the hillside were the telltale, gangly form and red flowers of *Rhododendron arboreum*. Ferns seemed to blanket both fallen and living trunks, as we neared half way, the prayer flags played with the lichen hanging from the trees, swaying gently between huge *Tsuga dumosa*. All the while the distant monastery perched high above encouraging us further. Those who have been on botanising trips before will be aware that walking takes a significantly longer time when looking at plant - I think it was our and our guides realisation that our pace was not going to be the fastest on the mountainside! Being in a landscape that is different really does entice curiosity and joy at finding 'something cool'! It was clear we were going to be getting good at bending down and walking up steep hills at the same time!



Rhododendron virgatum



Primula rotundifolia

Nearing the top of the walk, the views were mesmerising, I for one have never seen so much forest cover in all directions. The monastery was across a gorge from us, a bewildering combination of balance and craftsmanship. Nearing the entrance, a waterfall tumbled down the rocks to our left. Further along the path a spring emerged next the path, which being holy water, we were encouraged to drink. Beside this in the overhang of the rocks was a collection of interesting plants – a *Primula rotundifolia*, and an exquisite *Rhododendron virgatum*, with a few pale pink flowers delicately peering out from the rocks.

Into the Monastery we went, learning the history and stories of Buddhism, and Bhutan. We learnt that in Bhutan the head of Buddhism and the King are recognised as complete equals. Interestingly In the Vajrayana Buddhism, which is mainly followed in Bhutan, the aim is to care not solely for oneself but for all living things.

This was a spectacular start to the trip, a real meeting of culture, nature and religion, and how these influences meet to contribute to the Bhutanese way of life.

Day 2 – Monday 24th April - Sorig Museum for Traditional Medicine and Lamperi Botanical Park

We were staying in Thimphu, Bhutan's capital, which is in a valley in the Northwest of Bhutan. Once paddy fields, these had given way to development. During the Covid pandemic, construction had been put on hold, and was starting back up again – it seemed everywhere you looked there was a building clad in a precarious looking crisscross pattern of bamboo scaffolding.

Our second morning was going to be spent at Sorig Museum for Traditional Medicine. I think it's fair to say we were unsure what to expect as, with lot of things about Bhutan, there was little information available about the museum on the Internet. In Thimphu there is a standard 'normal' hospital, and there is a hospital that focuses on traditional medicine. To support that there is also a Faculty of Traditional Medicine, and a small museum within the buildings. We were shown the rooms that detailed how traditional medicine was used, through interesting drawings, and diagrams centered around the body. These were in Sanskrit so we couldn't read them, however it seemed to be similar to Chinese medicine. The other room was filled with plants and herbarium specimens, on paper and in jars, describing the plant and the ailments that it treated. There were many familiar plants we use ornamentally but had no idea they could also be used medically. This was an insight into a way of using plants, one that people have relied on far before modern medicine, and still do. For many people in Bhutan there simply is not the option or the infrastructure to go to the local GP or pharmacy. Instead, resourcefulness and knowledge of the plants around them and oral teachings passed down through communities would be used to treat pain or illness. We picked up some fascinating books of the flora used in traditional medicine, with one of the books featuring over 400 plants that were from Jigme Dorji national Park – where were to be hiking the next week. Although the book is also in Sanskrit, it has plant names and pictures, which proved to be useful when looking for plants later in the trip!

With some Gooseberry tea and oil to help altitude headaches we set off for Lamperi Botanical Park, known for its *Rhododendron* collection. We drove up the valley from Thimphu up to Dochula Pass. We were at the end of the dry season in Bhutan; the mountainsides were parched with minimal tree coverage. We noticed a few clusters of tall, narrow white flags attached to poles across the mountainside. These were places of remembrance for people that had died. The dry, hot weather, and high winds made this area prone to wildfires. Our guide Tashi pointed to a few white flags explaining that there were for some fireman who had lost their lives trying to put out the wildfires. It was a stark and poignant reminder that the climate changing is having devastating effects on people and places everywhere.

As we got closer to the top of the Dochula pass, the forest cover changed from pine trees to more deciduous, cloud forest cover. We could see huge great *Rhododendrons* accompanying the trees, with *Magnolia campbellii* and *Magnolia campbellii* var. *alba* flowers dotting in between. It

created a beautiful, colourful abundant forest, greens, pinks, reds, and freckles of white. From the top of Dochula pass a truly spectacular view of the Himalayas can be seen, which we only knew because of a detailed sign, depicting the mountains on the horizon! Through the distant cloud we caught glimpses of vast cliffs, but that was all – for today the great mountains remained mysterious and aloof.

The abundance we had seen near the top of the pass only increased as we continued down the other side of the mountain. I'm sure I spotted *Miscanthus nepelensis* on the roadside banks! As the mountain grew above us, we made our way down winding roads, craning our necks to look out the windows, out to the landscape beneath and above us.



Rhododendron kesgangiae at Dochula pass.

Unbeknown to us there was to be a *Rhododendron* festival on at Lamperi Botanical Park on the day of our visit. We were excited to see what exactly this meant, however it turned out to be less about *Rhododendrons* than we had thought, but nonetheless was still a great experience. We think it was a local school and dance group that had come together and were putting on a performance of dancing and singing, and yes, we were encouraged into joining in! Once we had tried our best to learn the moves and given a good laugh to those watching, we went off to look at plants!

The park ranges from 2100m – 2750m and forms a biological corridor between two national parks. In total it covers an area of 47 square miles, forming the heart of tri-junction between 3 hill ranges. Its purpose is to protect the flora and the animals that are endemic to the area. The park says it has 46 species *Rhododendrons* - 18 being native to the park. Helpfully there was a slightly overgrown but useful, labelled bed of some of the *Rhododendron* species that could be found in the park. This was great to see them together and compare the differences, which definitely helped later on when it came to identifying the different species. We set off for a walk around the park noting some interesting plants along the way including *Coelogyne orchracea* and *Agapetes serpens* epiphytes, hanging in the tree branches. The park had some huge *Quercus* and *Betula* trees– the biggest I've ever seen. There were fewer *Rhododendrons* than we expected but still a great variety of plants to get excited about.



Left: Signs in Lamperi Botanical Park, Right: Selina in Lamperi

Day 3 – Tuesday 25th April – Serbithang Botanic Garden

The Botanic Garden sits high on a hillside above Thimphu, a zigzag road taking us to the entrance. A few friendly dogs welcomed us, keenly showing us through the entrance. When we arrived, the gardeners were busy removing a *Ligustrum* hedge as it was damaged from a reoccurring pest or disease...only to be replaced by *Buxus*!



Above: View from RGB Serbithang down to Thimphu
Right: *Chiloschidta gelephuensis*

At 25 years old the botanic garden had been created by the last King, on land up a hill above Thimphu. It has an interesting topography and has several different areas that had been developed in conjunction with festivals or foreign exchanges.

We met Pem Zam (the Biodiversity Officer of the botanic garden) and the rest of the team for their morning break. At RBG Serbithang there are 5 full-time horticulturists and a few more seasonal gardeners. We were welcomed warmly and learnt that most of the full-time team had been to Wakehurst for training! After some delicious snacks and tea, we had a tour around the garden with Pem and Kezang Tobgay – who is working in collaboration with the MSB, collecting tree seeds. We had a tour around the garden, visiting the orchid house, the fernery, the nursery area, interpretation building and the new micropropagation building.



Left: The orchid house, Right: The new micropropagation building

The orchid house was interesting, with many different species being looked after and displayed. Kezang and Pem were part of a team that recently discovered a new species of *Chiloschista* orchids and is currently endemic to Bhutan or at least as far as they know. They named it *Chiloschista gelephuensis* and it is currently being cultivated in their micro-propagation laboratory. A recent addition to the garden which will help them with their orchid conservation efforts.

Day 4 – Wednesday 26th April - Serbithang Botanic Garden

We walked up the Botanic Garden, hoping to get some last-minute altitude training in before the big hike! There was a pale-yellow wild rose that was everywhere, which was *Rosa sericea*, interestingly it had a much smaller flower than the one at Kew gardens, perhaps as a result of altitude.

The botanic garden is part of The National Biodiversity Centre, and as part of its outreach, coordinates a festival celebrating biodiversity every year. A new site is chosen each year and then is designed and planted up to celebrate nature. The gardens are then left for that area to keep. It's a huge amount of work and often means 1-3 staff are working elsewhere for 4-6 months. We had timed our trip to coincide with helping at the festival but learnt that it was cancelled this year due to a 'lack of resources'.



Left: Rosa sericea, Right: Flowers prepared for the flower festival

We had another look at the many polytunnels and plants that had been prepared for the cancelled flower festival. Pem and the team had decided to use the flowers in the garden or the upcoming National Biodiversity Day instead and asked us to help design some planting for the car park and entrance area to make it look more inviting and interesting. Using the range of the plans they already had we came up with a few different ideas.



Left: Selina drawing out ideas and designs for the entrance of the garden.

That afternoon the garden was having a visit from the newly appointed UN ambassador to Bhutan, who we ended up having tea and biscuits with. He was interested to learn what we thought of the garden and what it needed – no pressure then! It was good to meet him, and we concluded that the garden was a really valuable space and needed the continual support of

Bhutan to be able to keep protecting Bhutanese flora and being able to commit to their outreach and education programs.

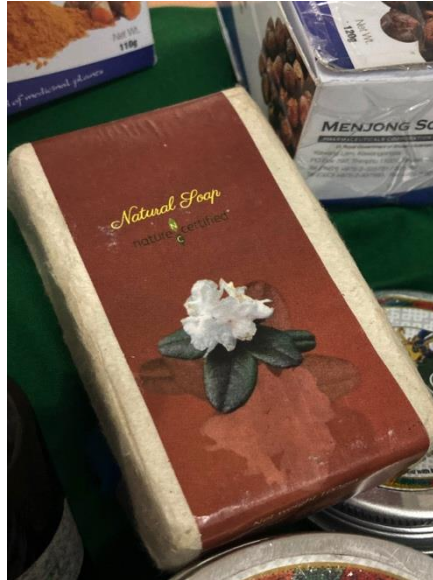
We finished off the day with a walk up to a viewpoint. Walking up to it we discovered the garden was bigger than we thought, with a more naturalised area easing into the landscape. The path led us up to a really magical lookout area over the surrounding mountains, with prayer flags blowing in the wind against the hazy sun. We spent a bit of time here, taking in the views and appreciating just how special it was to be in Bhutan.



The viewpoint at
RBG Serbithang

Day 5 – Thursday 27th April - Serbithang Botanic Garden and The National Biodiversity centre.

This was our 3rd day in the garden, and we spent the morning helping the other gardeners take down a bamboo fence in the car park – it was nice to be back doing something physical! Pem Zam had also offered to take us further up the hill to the Biodiversity Centre and the Herbarium. Whilst it was a shame to stop working with the other gardeners, we were very keen to see these.



Left: The National Biodiversity centre, Right: Rhododendron soap!

The National Biodiversity Centre is part of The Agriculture Ministry that also oversees the botanical garden. The other departments include plant genetic resources, national invertebrate program, animal genetic resources, biodiversity information management and bioprospecting. Whilst there we had an insightful and informative chat with the head of the biodiversity centre, Dr. Karma Dema Dorji. We asked about the challenges they were facing, and talked of how Bhutan was trying to grow economically but how this could potentially have an impact on the biodiversity of Bhutan, and if it would be possible without losing Bhutan's unique way of life. One of the ways that the centre is creating revenue is by using plants and traditional knowledge as a resource is in their bio-prospecting program.

When the program started, the staff working there went out into Bhutan and documented traditional knowledge of plants and their uses. This information was recorded and patented in a top-secret database. Chanel has recently used *Swertia chirayita* in a new skin restoring face oil, through the bioprospecting program. Traditionally it is used to treat a number of ailments such as liver disorders, malaria and diabetes. This plant now has a premium price, with the community where the knowledge and plants come from also receiving a monetary benefit, which in turn has enabled people to grow the plants in cultivation. In the past it was collected from the wild without management plans.

It was fascinating to hear how bringing economic wealth to the 60 households to enable cultivation of the plant, has meant averting over collection from the wild. Not only does this benefit the wild *Swertia chirayita* population, but it has also improved the quality of life for those involved.

In the National Biodiversity Centre, we were also shown the seed collection and storing areas, and the process for this. Afterwards we went to see the national herbarium, Pem Zam let us indulge and have a look at a variety of different specimens. There is something so special at being able to look face-to-face with the collected plants; we were actually seeing Bhutan's botanical history laid out on a table. This was a good opportunity to see plants that we might not in the wild due to the time of year, so we made sure to find the *Rheum nobile* and *Meconopsis gakyidiana* – the national flower of Bhutan. It also proved useful looking at plants we hoped to see out in the mountains, such as alpine Rhododendrons.



Left: *Rheum nobile*, from the National Herbarium of Bhutan Right: *Rhododendron* species from the National Herbarium of Bhutan

Day 6 – Friday 28th April - Lungchutse Trail

Pem had offered to take us on a walk that was particularly known for its *Rhododendrons*, so of course we keenly accepted and went back up to Dochula pass where the trail began. We were headed up to another monastery, and along the way we would pass through the forest we had seen from the car a few days earlier. Both of us were blown away by this walk.



Above: *Giant Rhododendrons on the Lungchutse trail*



Left: *Bryocarpum himalaicum*, Right: *Daphne bholua*

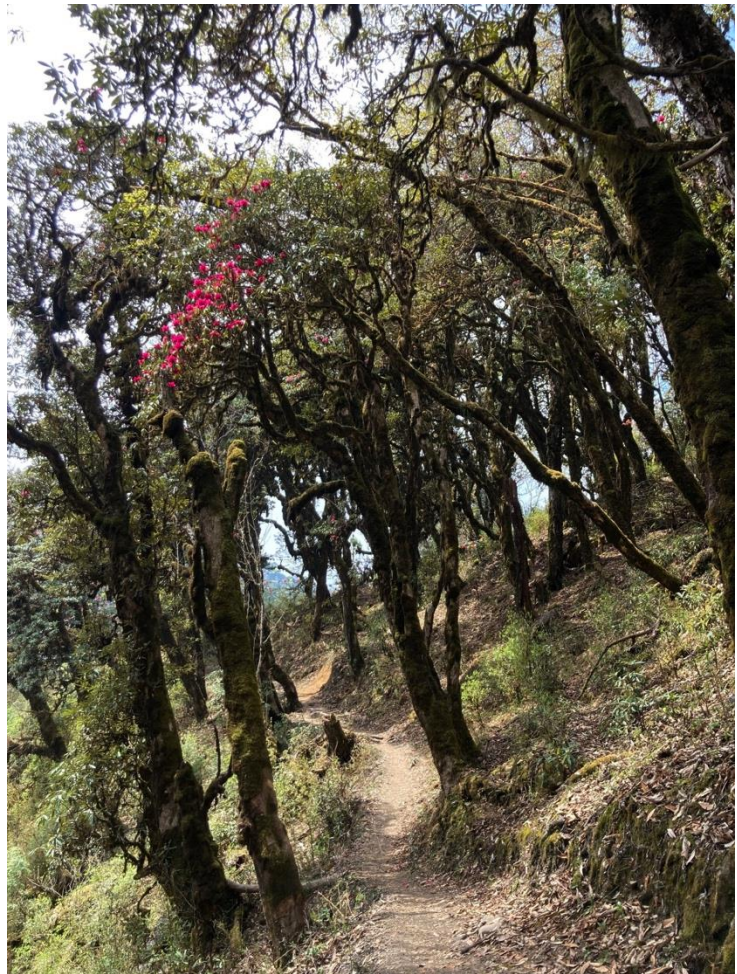
The *Rhododendrons*! So tall, towering far above us, with their flowers almost too high to see. It

created an otherworldly ambience, stepping right out of the pages of a fairy tale. On the steep hillsides the old-growth forest of Rhododendrons was able to get enough moisture from the air and from the ground, but also had good run off. They were covered in moss, which must help in retaining moisture ensuring they don't dry out in the dry seasons. The moss and lichen were incredible, covering everything and forming ball like protrusions on the trees. Not only was the moss locking in moisture for the plants, but it was also providing habitats for creatures as well as the ideal conditions for young seedlings. We saw *Rhododendrons* growing all over the place: in crevices where old bark was decomposing, and as epiphytes on other trees.

As we walked, we saw *Ekianthus*, *Vaccinium*, *Daphne*, *Hydrangea heterophylla*, and *Agapetes* all just along the trail path. Nearing the monastery, we were treated with *Primulas*. Again, the view was a mostly cloudy one, but the skyline of the fir and hemlock forest created a striking silhouette. On our way back down we encountered our first Yaks!



Above: Excellent soil from the Rhododendron forest floor, Right: Rhododendron flowers high up in the canopy



Left: Our first encounter with Yaks!

Day 7 – Saturday 29th April - Jungshi handmade paper factory

This was our last day before we were going to the national park, so after running some errands and collecting last minute supplies, we visited a paper factory that we had heard about. This turned out to be a very special experience. In Bhutan *Daphne* bark is used to create traditional paper, and is made in one small factory by hand in Thimphu. A group of women were sitting down around a big pile of wet bark that they were sorting by hand. The finer better-quality bark is used for the best paper, which is smooth and thin, and then the courser bark is used for slightly thicker paper, which is of 'lesser' quality. The highest quality papers are used for traditional texts and writings. The pulp is sieved through water and laid out onto bamboo sheets, which were then transferred to a large pile. These were then moved onto heated metal sheets to dry. As an artist who loves to work on paper, this was a really exciting process to see!



Left: The pulp is sieved and laid out



Left: A stack of dried paper, *Above:* Sorting the *Daphne* bark

Week 2 by Selina

Day 1 – Sunday 30th April



Shrub and tree layer at the start of our trek.

Like most trips to the countryside, the start of our trek began with a car journey taking us from the capital city of Thimphu to Paro. Deepening into valleys of the mountains, following the Paro Chu (*chu = river*) we found ourselves at the entry point to Jigme Doji National Park where we were greeted by soldiers to check our visas and permits. Bhutan has an ancient trade route to Tibet which is still illegally used by the bordering countries of India and China who sneak through the mountains. As such, a registered tour guide, visas and permits are a must.

As expected, you could feel an instant shift in the environment with a lightness and coolness in the air. After we met our complete team including Tshe Wang (Head chef,) Zang Po (Assistant) and Karma (Horseman) as well as our guide Tashi we set off into the wild at 11:30 am for the next 8 days. At 3250 masl, we continued to follow the Paro Chu, the trek began walking through dense forest land of towering *Tusga dumosa*, *Pinus wallichiana* and *Quercus semecarpifolia* amongst other plants and despite being in foreign land there was a sense of familiarity. All the layers that make up a forest were to be found from the ground flora, shrubs, and trees. Day 1, non-surprisingly was one of our shortest days hikes; to ease us in and acclimatise us low-seal level folks, and thus we got to the first camp site at around 3pm. After a much-needed cup of tea, Zoe and I used the time opportunity to explore and familiar ourselves with the surroundings and get our botanising brains working. Some plants we spotted were *Rhododendron* spp., *Paris* spp., *Primula*'s as well as ferns and orchids at various stages of their life cycle.



Left: Zoe admiring Rhododendron cinnabarinum, Centre: Paris polyphylla, Right: Primula denticulata

Day 2 - Monday 1st May

Day 2 of our trek began at 3700 masl with some slight rain that eventually turned heavy. This felt fitting for our trek through the forest alongside the Paro Chu. Whilst rain can often be met with annoyance, I often find plants look more pigmented once wet and as such, the reason Bhutan is so rich is because of the high rainfall in the summers. As we were visiting quite early in the flora season, there was a sense of plants just waking up. This part of the trek also happened to be the first and only biological corridor we would pass called Nubri Soe Junction.



Rhododendron campanulatum, Zoe and I.

Continuing we saw logging stores as part of the Community Forest Programme. To encourage nomads to stay in their villages (as opposed to pursuing jobs in the city,) Bhutan have instated various programmes to help support villagers. One of which is allocating specific trees to tribes through permit application, where they can manage them to fit their needs. Here they have been logged to be used for schools, houses offices etc. They are currently in the process of being dried so they become lighter to be lifted back up the mountains for construction. A house, for example, requires 18 trees with one tree costing 30 Nu (£3) to the villages. Commercial businesses are barred from applying and must buy their wood from sawmills.



Planks of wood, stored for drying.

Day 3 – Tuesday 2nd May

As we started to make gains towards Jomolhari base camp (4115 masl,) it started to feel cooler and fresher. It was clear we were entering the sub-alpine range as snow covered mountains start to peek ahead of us. Like the UK, Bhutan saw an unusual cold and late winter and so unfortunately the flora was not as ahead as we would have liked. Nonetheless, the landscapes were beautiful and gave us an overall scope of how plants survive on the fringes of harsh weather and terrain. Reaching Jomolhari base camp, we were greeted by a football match between tourists and locals, at 4115 masl, we gracefully declined in favour of catching our breath. This was the first time we'd see other tourists. The site of other tourists had highlighted that we had, in fact, seen no other tourists during the last few days. A reflection of post-covid times but also their tourism strategy that implements a tax to foreign visitors to maintain their environment from overuse. It was a reminder of the privilege of being able to be there but also a testament to how pristine and abundant their country is.



Mount Jhomolhari and base camp.

Forgoing the “beautiful game,” we instead opted in search for beautiful plants. As if the ever-present mountains weren’t obvious, it was clear that we had reached well above the tree line. Although there were shrubs to be found, you could see the difference in habit and overall appearance. Plants looked more weathered and seasoned if you will. Toughened to their environments as well shorter and tighter in habit to seek protection from the harsh winds and sunlight. It was quite incredible observing the plant adaptations and seeing them react to the environment whilst we to, were trying to adapt.



Left: Saxifraga andersonii, Right: Rhododendron anthopogon

Day 4 – Wednesday 3rd May



Zoe and I in front of Tshophu Lake

For our second day at Jomolhari base camp we awoke to a fresh 4°C and a light blanket of snow albeit sunny and bright. Opting for a day hike to visit Tshophu Twin Lakes (4430 masl) this would give us an opportunity to botanise and continue to acclimatise. The walk was steep and hard, to say the least, giving us a taste of what was to come. Along the way we passed Mount Jitchu Drake where the glacier that makes Paro Chu resides as well as managing to spot a few alpine plants on the way such as *Gentiana urnula* and *Corydalis cashmerian*. After a hard walk we finally reached the breathtaking Tshophu Twin Lakes when it started to snow! A clear theme started to emerge on this hike that the contrast between harsh conditions were often offset by epic views and for a moment we were able to forget our tiredness. Like mountain peaks, lakes are considered sacred dwellings of gods and goddess in Bhutan and so this lake has apparently been untouched by humans. Whether this is true or not, will remain unknown.



Left: Corydalis cashmeriana, Right: Gentiana urnula

Day 5 - Thursday 4th May



Epic views.



Zoe at the stop post for Neyleyla Pass!

Concluding our time at Jomolhari base camp, we were given the go ahead to press forward with the trek. NB - A few nights at base camp would allow for the guide to properly assess our condition and whether we are strong enough to go further. It was decided, we were. I can understand why our guide wanted to assess our fitness before this trek. It was considered the hardest day of our trail with a walking time of about 8/9 hours. The start was as usual, Zoe and I often took the back of the team, stopping and re-starting so we could take pictures of every plant we could spot. It wasn't until we got to the valley headed towards Neyleyla Pass, where botanising quickly become extreme sports. All plants ceased to exist as we pulled focus on walking through harsh winds to the pass to get over to our next trail. It's quite difficult to comprehend the changes the altitude takes on your body as you are so taken by your surroundings, but your body does. Simply crouching down felt like a full body workout and so when we did finally make it over the 4877 masl pass, it felt like a huge triumph that was overcome with emotion. Something that was definitely not on our aims and objectives!

Upon coming down, we were happily met by familiar sub-alpine plants and shrubs. Before finally settling back down to earth at the camp site of 3700 masl.



Tashi, Zoe & I enjoying a chilled lunch.



Zoe rejoicing the shrub layer!

Day 6 - Friday 5th May

Day 6 and it isn't over just yet. Officially making it over Neyleyla Pass, we thought we had gotten over the worst. Whilst today was expected to be easier, there was still one challenge ahead of us. Proceeding through the valley, you could instantly feel a sense of groundedness as familiar plants began to pop up such as *Gentain's* and *Primula's* and despite dormancy, you could see the skeletons of what the alpine shrub layer would be. Walking with a sense of achievement, having reached 4877 masl yesterday, I couldn't help but succumb to the toll the environment was

taking on my body. As the trek got further in, I began to get slower, weaker, drowsier but despite those symptoms, I was determined to shake it off. I had chalked it up to simply being tired as one would become on a trek through the Himalayas. However, it had become apparent, my body was suffering from a severe case of altitude sickness. Every ten steps I needed a break or to simply close my eyes, as the lack of oxygen tempted me to slumber. Although we had researched altitude sickness beforehand and knew some of the signs, it was hard to grasp quite how much it had affected me. As we approached our final hurdle – a 4900 masl pass, we decided to stop for lunch.

Soon after, a monk came by to sit with us. The monk named Master Lum, usually lives at the base of Johmolhari at 4100 masl, lucky for me happened to be passing on pilgrimage with some friends. He thought we were farming for Cordyceps, a lucrative fungus found at high altitudes, until he quickly noticed me half asleep as I tried to ladle calories into my tired body. At this point, I started to register the extent of the situation as Tashi and Zang Po began to show concern and discuss options. It was clear, I was not going to make it over that mountain alone. We had gone too far to turn back and so going over the pass was essential to get me back down to lower altitude. Kindly, the monk had leant us his horseman and so it was decided I would ride over the mountain despite my fears of an allergic reaction. I couldn't help but let my emotions get the better of me as I began to realise how serious it all was. It turns out, an allergic reaction was the least of my concern as I stumbled up a steep mountain on a tiny horse, bawling my eyes out with overwhelming tensity. Of course, it had snowed the night before and so the path was untouched and as smooth as an ice rink. Once we were over the 4900 masl pass, Master Lum wiped my tears so that I could see the beautiful peaks laden with fresh snow and clear blue skies and told me to 'let it all go.'

A stroke of luck comes to mind in this situation or absolute sheer coincidence, either way, I'm truly thankful for their kindest and their willingness to stay with us until the end.



Master Lum and his friends, Tashi, Zoe and I back down at manageable altitude.



Otherworldly views

Miraculously, as we made the descent back down to safer ground, I began to feel like myself again. Never had I been so humbled by the environment. As we were walking on the west side of the mountain, it was clearer that the vegetation was enjoying the warmer, more humid climate as we began to descend back to the tree line. I don't think I had ever been happier to see a tree!



On our way down, the tree & shrub layer start to reappear.

Day 7 – Saturday 6th May



Walking through Tim Chu valley.

Back to lower ground and quite literally feeling closer to home. Day 7 was a welcomed walk alongside the Timchu River. As mentioned, we were further west of Mount Jomolhari and so there was distinct warmth in the air that was unlike the east. The environment felt more lush, and it was clear, plants had awoken earlier as we began to see more diversity. We were also able to see dry riverbeds where plants thrive before being engulfed by the summer rain. It was fascinating observing the diversity in such a small proximity. Every crevice had a different story to tell on how and why that plant may be dwelling there.



Left: Primula spp., Right: Pinguicula alpina



Left: Betula utilis, right: Horses transporting planks of wood.

Day 8 – Sunday 7th May



The end of our trail, in the process of being turned into a village.

Unfortunately, our trek had been cut short at this point. The last stretch of our trek had been deforested in way of a new road to be built. It was quite disappointing to see that this had not been pre-warned to us at the beginning of the trek and so we made our car journey back to the city. In reflection, despite deforestation, villagers now save a day in travel during their trips to get supplies and produce. A catch-22 in the balance between humans and the earth.



A local family kindly invited us into their home for a final feast.



Tshe Wang, Tashi, Zoe, Zang Po & I.

Challenges

The things that didn't go quite to plan...

- We had planned the date of the trip to coincide with the annual outreach flower festival that the RBG Serbithang organises. However, this was cancelled very last minute, which was a big shame for the team in Bhutan who had put a lot of effort into growing the plants for it. We originally had planned to go later which would have given us more time to plan and potentially we may have seen more plants as the temperature become warmer.
- As great as Lamperi Botanical Park was, there were far fewer species of *Rhododendron* than we had imagined. Perhaps they were more hidden away in the hillside, away from the path.
- It was also apparently a long winter that meant the land was dry in Thimphu, and still cold and snowy in the mountains! This must have influenced the plants we saw in the mountains, especially the alpiners. To see these at their best would be to go in June/July, however that is in the rainy season, which can be quite challenging in the mountains.
- On the hike we were both prepared for altitude sickness, but not too sure what to expect. With Thimphu at 2350m, the first week acted as an acclimatisation period. Despite this we were still affected by it, which proved to be quite challenging. The guides we were with were knowledgeable and well equipped to help us through it.
- The final day of the hike was cut short due to a road being built to the monastery. This was a great shame as the steep wooded area was very beautiful. We had also had an extra-long day the day before, which turned out to be unnecessary, although it was an adventure! As with anything that doesn't go directly to plan, it's a chance to learn and become more adaptable.



Left: The new road out of Jigme Dorji National Park

Overall summary/ Conclusion

Selina Tan

To summarise a trip of a lifetime is nearly impossible to say the least. I still get goosebumps when I look at my photos and pinch myself when I think about what Zoe, and I were able to achieve. It goes without saying, how thankful I am to have been provided with this opportunity.

When I was planning my travel scholarship, I must admit, Bhutan was not my first choice. I kick myself at the thought because of how perfect Bhutan is and how it aligns with my personal horticultural interest and passion for understanding this connection that plants have with people. I remember deciding that overall, I had wanted to go to the Himalayas. My apprenticeship had included one year in the Isabella Plantation in Richmond Park, a garden known for its extensive Rhododendron collection and so it seemed apt that I would visit a country that grew plants I felt so comfortable around. So much so, at the risk of feeling under pressured and overwhelmed, for this trip, I had set myself the simple target of seeing one Rhododendron. Of course, my expectations were greatly met! In conjunction with my interest for Himalayan flora, their successful community conservation programmes further solidified how much I wanted to go.

Despite some challenges met on this trip, I think what was 'lost' was gained in other ways I wasn't expecting. Whilst we had a specific aims and objectives, that I believe we met, it was the intricacy of how important each one complemented each other that really painted a picture of Bhutan for me. Although we were unable to participate in the flower festival, the time was otherwise spent talking and getting to know the other horticultural staff there. It was some of those conversation that really shed a light on not only the plants but the culture around them as well as also learning about the day-to-day struggles of their industry and how much they correlate with ours. Had we not spent that time to establish relationships and trust each other to share knowledge, I would not have gained as much. In understanding their approach and culture, this then thread through to their communities in the wild and in some ways, can highlight why Bhutan has strong conservation programmes. Rather dominate and 'control' nature, they work with their environment to support them sustainability. It was wonderful to see a blueprint of a programme that appears to be working. It is worth stating that, Bhutan focus' on their native flora only and so in comparison to Royal Botanical Gardens Kew, it was hopeful to see success in a focused area.

What we learnt at the Botanic Garden further extended to our trek where I was able to test out my botanising skills and to see landscapes that I had only imagined in my head through readings. I felt I gained a lot of confidence botanically during this trip as I no longer had the safety net of labelled plants and access to databases galore of plant information. Instead, beady eyes with a touch of intuition were our main tools for success. As a horticultural student, there is no better joy then being able to recognise plants in the wild and feeling the confidence of knowing you are right. Of course, I did not know every single plant, but to at least recognise a family or genus was a real testament to the hard work paying off.

Wider to the plant it was always incredible seeing the tangible change in environment, how seamless it had all felt at the time. Each environment abruptly changing as the altitude changed yet harmonious as one ecosystem. In the day 8 days we were there we saw countless habitats from temperate rainforest, dry riverbed to alpine and we weren't even in peak flowering season!

It was poignant to learn that our trek had been cut short due to deforestation. A true reality check. In some ways, I thought, because Bhutan had such strong conservation programmes, that the people were naturally environmentally inclined. It turned out, the Bhutanese to want more convenience, more opportunity, more accessibility and who were we to question that when we have everything at our fingertips in the bustling city of London.

As I mentioned before, like at the Botanic Garden, it was the small conversations we had at campsites with other tour guides or the little tidbits that Tashi would drop here and there to us that really revealed the Bhutanese culture. This further enforced their belief in ecotourism and that you are only permitted to trek in Bhutan with a certified tour guide and crew. They believe that it is not only safer, but that you gain a richer experience with a tour guide (which I can attest to.) As a tourist you can only respect what a country chooses to do, it did however pose an interesting question on eco-tourism. In charging a high price you limit the number of visitors in support of your environment on the other hand you limit your people and their opportunities. We found that tour guides and crews were greatly affected by the increased tourism tax post Covid as they were no longer getting the work. Bhutan's tourism is the second biggest industry and so you can imagine this would have a great effect on their economy. Pem, from the Botanic Garden, had also iterated to us how many of her friends were moving to Australia in hopes for more job opportunities. Was Bhutan's greatest offering, its environment, becoming Bhutan's greatest hinderance for growth and development of their people?

These conversations were priceless in my opinion. They had posed more thoughts in me than I had intended and offered us more than simply seeking plants. With that, I am forever grateful for the knowledge that the Bhutanese people were so willing to share.

I think an interesting aspect that should not be overlooked is Bhutan's belief in Buddhism and how ingrained it is in everything they do. They don't climb mountains, cut trees willingly or swim in lakes because they are sacred. Whilst beautiful and what we may think is poetic in sorts, it's interesting in how that informs policies and conservation programmes in that the King and the Je Khenpo (The Chief Abbot of the Central Monastic Body of Bhutan) have equal standing above the government. Even more interestingly I distinctly remember Dr. Karma Dema Dorji stating that the people trusted their King. This really stayed with me, it felt like it empathised this community that worked together because they had belief in a system. Whether it is good or bad is hard to say but the fact that there was this central goal to work towards that the majority believed in felt like a foreign concept. It creates a nuance in our society where criticism and independent thinking is encouraged yet are we failing to maintain our fragile environment. Is this something we can learn from the Bhutanese?

Zoe Roberts

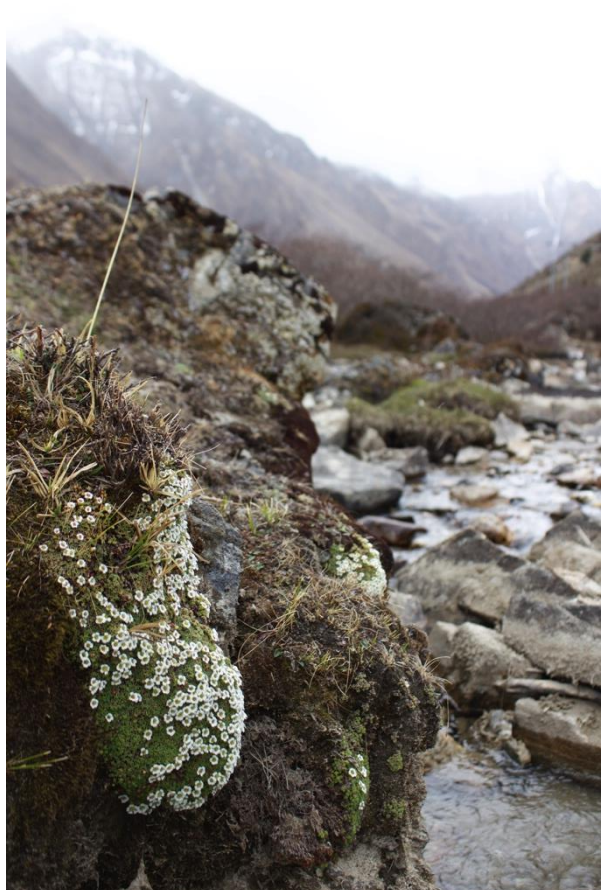


Left: En route to Jomolhari base camp

If you had told me a year ago that I would spend two weeks in the Himalaya's, in Bhutan, to look at plants, I would have thought you were bonkers. Bhutan is a place that seems so mysterious and otherworldly. I feel so fortunate that this opportunity has given me a chance to step into that world for two weeks and explore what it means to be Bhutanese and learn about the landscapes and the plants within them, and how people use them. What started off as a trip to look at plants ended up being just as much of a cultural understanding - a chance to learn about the Bhutanese way of life, make connections, and gain confidence.

What struck me was how integrated Buddhism was with nature and how people respect the environment considering Buddhist values. For example, mountaineering is not allowed in Bhutan, as mountaintops are where deities are thought to live. This means that these fragile environments are preserved and protected from human impact.

On the other hand, it seemed that people living in more urban areas, particularly the younger generations seemed more uninterested by the natural landscape. We found out that hardly any people go hiking for recreational purposes in Bhutan, and it was mainly seen as a tourist pursuit. Was enjoying nature seen as a privilege or was it simply overlooked? I think partly the access to these regions is difficult, which historically has made travelling around the country very slow. Now there's also a big movement of young people leaving Bhutan to go and study, particularly to Australia. The rise of social media, especially Instagram has opened exciting places to visit and live, perhaps with more freedom and experiences available, such as being near the ocean and big cities.



Left and Right: Androsace near Jomolhuri base camp.

In the national parks, we met guides, cooks and 'horseman' who had built a lifestyle in the landscape through tourism. The nomadic families were very much reliant on the landscape itself, herding Yaks and collecting cordyceps. The people in the mountains are the custodians of their landscape, and because they depend on it so much, they must look after it sustainably and considerately for it to preserve their existence. On our hike in the alpine regions we passed coppiced *Salix*, which was used as firewood. This seemed so simple and clever, and crucially, sustainable in an area where wood was scarce. We also saw a lot of Yak poo piled up against houses and on walls. This is dried and used on the fire. Where resources are limited, creativity entails!

The desire for connection and development is however, expectedly, having an impact on the landscape and environment. On our last day the trek was cut short, as the trail simply didn't exist anymore. Instead, a road had been built which cut a day worth of walking out of the national park. For us this was quite a harsh jolt back to reality, but for the villages it makes their access easier and quicker. It did however cause quite a lot of destruction, with the mountainside clearly damaged by this. On the plus side at RGB Serbithang, we saw how the work of a few individuals can revive species and help restore habitat loss. It's so important to have places like the Botanic Garden that teach children and visitors about the plants that surround them and the importance of them. RGB Serbithang does this well, with a great interpretation building, that is multisensory and accessible, with signs and leaflets in braille.

The hike was probably the greatest thing I've ever done, such incredible landscapes, and to be able to walk through and see the changes was amazing. It was challenging yes, but in the way that gives you confidence and knowledge that you achieved something special. People say it was a once in a lifetime trip, but I really hope it isn't. I would love to go back and explore areas that were more remote, to the north or to the east.

Being in the mountains and witnessing first-hand how it and the plants changed with altitude and aspect was definitely a big takeaway of the trip. There's nothing quite like being in a valley filled with alpine meadow and then crossing a pass to a barren exposed steep mountain, which had a much harsher terrain, resulting in far fewer plants.



Left: At the top of the highest point 4900m, and Right: Lichen on *Rhododendron cinnabarinum*

The plant communities really stood out for me; it was never just one plant on its own that looked great, it was how it responded to the plants around it and how it sat in its landscape. The forest we walked through on our way up to Jomolhari base camp was magical. We were treated with a dewy morning, huge trees coated in the trailing lichen glistened and swayed as the morning sun poked through. Along the edges of the glacial blue river edge was *Rhododendron cinnabarinum*, its flowers ranging from yellow, to orange, to a pinky red. *Pieris formosa* was quick to pioneer any available space – I have a new appreciation for this plant, which thrives in its natural habitat.

I had many highlights of the trip, but one that stood out happened on the trek. We had had our first long day of walking, which was about 5/6 hours, coming out of the woodland, into the sub-alpine regions. The landscape had changed from lichen covered *Betulas* and purple *Primula* along the river, to giant mountains rearing above us, *Iris reticulata* beginning to poke out. The river had widened in the glacial valley as we made our way up to Jomolhari base camp, and we had our first light snowfall! Tired but energised by the dramatic new scenery, we followed the

river to the confluence where it becomes the Paro River. We were nearly at the base camp, and I had dropped behind to look in the river, which was shallow with a lot of rocks. As I wondered around something interesting caught my eye; a small alpine just above the waterline, clinging to the rocks – *Androsace*. I was super excited to find this, and then on my way to tell Selina, I also saw the alpine *Rhododendron anthopogon*, its tiny delicate flower almost translucent. To see these in the natural habitat was very special, it makes their features and adaptations make sense and shows just how tough they are. I just love alpine and my love for these was brought back to the surface. So defiant and so gutsy in such harsh and extreme environments, I think they are very admirable plants. And then to learn how useful and clever they are, well that was great!

This trip has made me more interested in how plants are used and conserved. By using plants for medicine and for bioprospecting, they will be in demand and thus valued, and hopefully then their habitats will also be protected. However, there is such a balance needed when nature becomes a valuable or scarce resource. Ultimately, it's a habitat and a home, for the plants themselves, for animals, and us. The balance of nature has a fine tipping point, and so far, Bhutan has been looking after it well.



Above: Incredible views of the Himalayas descending from Neyleyla Pass (4877m)

Final budget

Flights: London -> Delhi	£1278.8 (x2)
Delhi -> Bhutan	£971.10 (x2)
	= £2195.9
Packaged Tour (15 days) incl. Land cost (guide, water, 3x meals, permits, transports, accommodation), sustainable development fee, visa.	£8,910.00 (x2) (incl. bank charges & conversions)
Add-on additional day during trip	£181
Total	£11,286.90 (x2)

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Kate Hardwick - Conservation Partnership Co-ordinator (Asia+), Millennium Seed Bank Partnership

Barry Cooke – Vice Chairman, The Rhododendron, Camellia & Magnolia Group

David Millais - Vice Chairman, The Rhododendron, Camellia & Magnolia Group

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