

Darwin Initiative Capability & Capacity Annual Report

To be completed with reference to the “Project Reporting Information Note”:
(<https://www.darwininitiative.org.uk/resources-for-projects/information-notes-learning-notes-briefing-papers-and-reviews/>).

It is expected that this report will be a **maximum of 20 pages** in length, excluding annexes)

Submission Deadline: 30th April 2023

Submit to: BCF-Reports@niras.com including your project ref in the subject line

Darwin Initiative Project Information

Project reference	DARCC002
Project title	Building capacity and community resilience for grassland conservation in Bhutan
Country/ies	Bhutan
Lead Partner	Royal Botanic Garden Edinburgh, 20a Inverleith Row, EH3 5LR
Project partner(s)	Government of Bhutan, Department of Forest and Park Services. Government of Bhutan, National Biodiversity Center
Darwin Initiative grant value	
Start/end dates of project	9 May 2022 / 31 March 2024
Reporting period (e.g. Apr 2022 – Mar 2023) and number (e.g. Annual Report 1, 2, 3)	Apr 2022 – Mar 2023 Annual Report 1
Project Leader name	Colin Pendry
Project website/blog/social media	n/a
Report author(s) and date	Colin Pendry 9 May 2023

1. Project summary

The aim of the project is to develop Bhutan’s in-country capacity in the ecological assessment and conservation of grasslands, focussing on one high-altitude community which is particularly heavily dependent on rangeland resources. It seeks to address existing weaknesses in grass identification and develop new print and digital identification materials for Bhutanese graminoids (grasses, sedges and rushes). It works with local communities to promote resilience and enhance livelihoods through improved rangeland management and by building awareness of sustainable NWFP collection and exploring other sustainable economic opportunities.

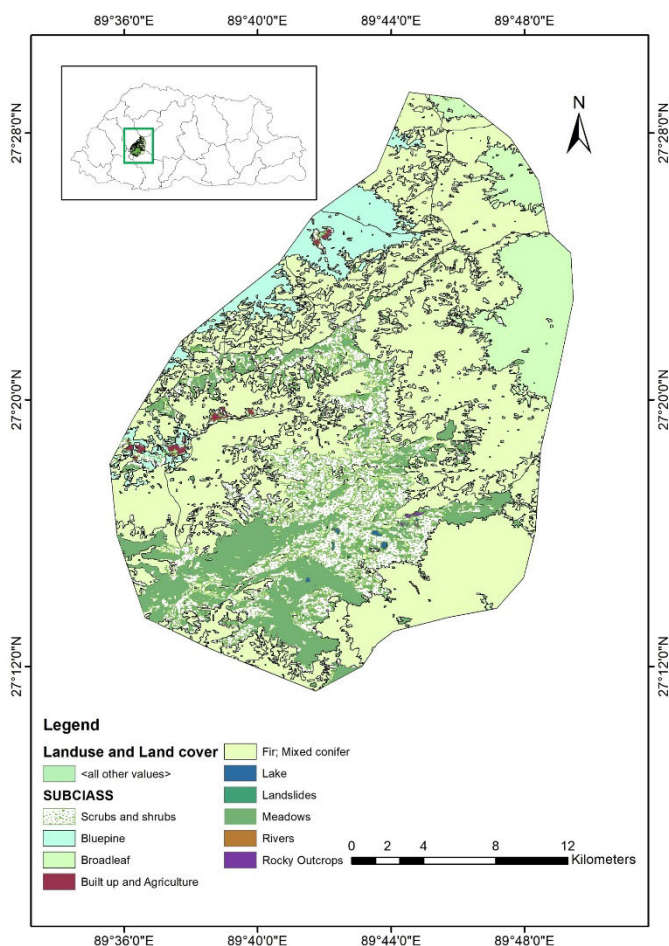
Despite their economic and cultural importance, grasslands remain among the most poorly understood habitats in Bhutan. Bhutan’s conservation efforts have largely focussed on birds, mammals and trees, and in its network of national parks and wildlife sanctuaries. The conservation of other important habitats outside the protected area system, which accounts for 49% of the total land cover in Bhutan, has received relatively little attention. The neglect of Bhutan’s grasslands has largely been due to the lack of in-country technical expertise in grass taxonomy. The understanding of the ecology and distribution of grasses remains poor.

Documentation of grass species, their use and conservation have received little attention and they have not yet been brought into the mainstream of Bhutan’s conservation policies.

Grasslands have been shown to be among the most vulnerable of Bhutan’s habitats and they are inordinately affected by anthropogenic pressures. Grasslands continue to be lost as they are replaced by commercial plantations of bamboos and timber trees. Furthermore, many grasslands in Bhutan have been severely impacted by invasive alien species. These have not only threatened the ecological integrity of the grasslands but also the livelihoods of the many communities depending on them.

With more than 80% of the Bhutanese population dependent on agriculture, secure grassland resources are key to the maintenance of livelihoods. While there are numerous examples of Bhutanese communities which depend on grasslands to support their livelihoods, the Jom Daga NWFP group in Thimphu is an extreme example as they are completely dependent on their grasslands in the absence of any other economic activities. These grasslands are threatened by overgrazing and decreases in productivity. A two-pronged solution is therefore required to sustain livelihoods in Dagala by consolidating rangeland resources while simultaneously developing alternative economic activities such as the sustainable harvesting of medicinal plants.

The study focuses on the alpine and subalpine grasslands of Dagala mountain range which cover about 88 km². The elevation ranges from 3000 to 4500 m, with the vegetation changing from temperate conifer forests in the lower regions to *Rhododendron* scrub and alpine grasslands at higher elevations. Mean annual temperature and rainfall in the area are 5.5 °C and <650 mm respectively. Dagala mountain range is inhabited by about 40 yak-herding family groups and is used as a summer grazing area. During the colder seasons they descend to lower elevations on either side of the range.



Map of land cover in the Dagala region and its location in Bhutan

Reliable taxonomy is critical to efficient resource management. For instance, local herders have suggested that a particular species of *Kobresia* is especially important for milk production. The species has been tentatively identified from a poor specimen as *Kobresia stiebritziana*, but this species is easily confused with other species, such as *Kobresia esenbeckii*, which have lesser impacts on milk production. Nationally threatened species such as *Stipa bhutanica* are thought to be present in this area, and identification of these populations will be important for conservation and monitoring.

The project highlights the need for improved grassland management and strengthened biodiversity conservation in regions outside Bhutan’s protected areas network. It seeks to address three critical issues. Firstly, it will develop in-country capacity in grass taxonomy and grassland management, and the identification resources created will be highly relevant of other high-altitude ecosystems. Secondly, it seeks to build community resilience through increased livelihoods, empowerment of women, strengthened biodiversity conservation and a reduction in overgrazing. The model developed here will be transferable to other communities in similar regions where livelihoods are often similarly marginal.

The problem was jointly identified by Thimphu Forest Division and the local community of Dagala. This occurred during Tshering’s tenure at Thimphu Forest Division where he led an ecological assessment survey of the Critically Endangered *Nardostachys jatamansi* in the Dagala area. Like the current project, he was working closely with the local communities in the identification of growing sites of *Nardostachys*, when the problem of overgrazing, low rangeland productivity, challenges of grass identification, and low socio-economic income were made apparent. Realizing the need for intervention, and the lack of in-country capacity, RBGE’s help was thus sought by the Ministry of Agriculture and Forests.

2. Project stakeholders/ partners

- After Tshering’s arrival in Bhutan in June 2022, he held a meeting with the representatives of the project partners with officials from the Ministry of Agriculture and Forests, the Department of Forests and Park Services and the National Biodiversity Center. This was carried out to discuss further course of actions and plan for the community consultation and fieldwork. Following this, a formal consultation meeting was carried out at the Dagala Gewog Center (Gewog = Block) to engage the community in the decision-making process. One of the main objectives of this, in addition to establishing a baseline of the level of awareness, was to decide on priority areas for research in their rangelands through this project.
- Similarly, the fieldwork was carried out collaboratively with relevant stakeholders. The objective of this partnership was to not only foster meaningful partnerships between the various institutions involved but also enhance their capacity in graminoid taxonomy, and grassland ecology. The RBGE continued to provide technical support where necessary and there has been constant communication between Bhutan and UK during this process using email and WhatsApp. All microscopic photographs to be used as an identification resource was possible through the generous support of the National Biodiversity Center, who let Tshering use one of their high-end Zeiss Stereo Discovery.V20 microscope.
- After Tshering’s return to the UK to commence his MSc course, project partners in Bhutan continued to work on the project. This includes collection of interview data by Melam Zangmo, and the processing and amendment of MTA by Jamyang Choden (both are official partners of this project). The employees of the National Herbarium have also been processing the specimens (drying and mounting).

A detailed summary of the collaboration between various partners in Bhutan are as follows:

Institute	Items and services	Remarks
Local government and community	Provided meeting hall for community consultation	All activities were carried out in consultation with the local

	Engaged local guides during fieldwork and shared information on the use of graminoid species	community. The choice of plots for sampling was guided by their expert knowledge of the areas.
	Tshering and his team were hosted for free during their field at their homes during	
Thimphu Forest Division	Four officials engaged during Community consultation and the collection of interview data	The office was involved in the planning and execution of the fieldwork at Dagala. The officials were selected based on their track records and their expertise in relevant field
	Nominated one high-quality official for fieldwork in Dagala	
	Provided their utility vehicle (a Hilux) to me and my team to pr	Only the cost of fuel was borne by the project
Forest Resources Management Division	Solar light bulbs, solar panels, Power banks, Digital scale	These three offices are the various divisions under the Department of Forests and Park Services. They provided support with various equipment for fieldwork and technical inputs where necessary.
Social Forestry and Extension Division	Gave a spare printer along with a new cartridge and a ream of paper for Tshering to use in the duration he was there in 2022	
Watershed Management Division	Soil testing kit	
National Biodiversity Center	One staff engaged during community consultation and the collection of interview data and one staff engaged during fieldwork in Dagala	The contribution of NBC has been critical for the smooth implementation of field activities. They were involved in the planning and execution of project activities.
	All field equipment provided- Herbarium presses with newspapers.	
	Provided access to their high-end Zeiss Stereo Discovery.V20 microscope	
National Soil Service Center	Analysed soil samples Lent Muensel colour chart	
College of Natural Resources	Analysis of biomass samples	

3. Project progress

3.1 Progress in carrying out project Activities

All activities scheduled for completion in YR1 have been finished on time, and those which are scheduled for completion in YR2 have been started in line with the submitted timetable. The main activity in YR1 has been the MSc in the Biodiversity and Taxonomy of Plants which is taught at RBGE with the degree awarded by the University of Edinburgh. This is a very intensive course, particularly for students whose first language is not English, and it was not expected that other project activities would take place for its duration.

Output 1 - Improved national capacity in Bhutan for plant biodiversity research and documentation, enabling the characterisation, identification and effective management of temperate rangeland plant species (grasses, sedges and medicinal plants).

1.1 Enrol Darwin Fellow (Tshering Dorjii) to MSc in Biodiversity and Taxonomy of Plants at RBGE/The university of Edinburgh, and provide support throughout the course. Course option taken through the year included into the student project will be based on those which best support the project outcome.

Tshering began his studies for his MSc in September. His marks have been consistently excellent, and at present he has an average mark of 81% (Annex 4.21). The taught element of the course has been completed, and he is now embarking on his research project which follows up on the baseline data collected in 2022.

1.2 Organize training programme for Darwin Fellow in digital plant photography, with particular focus on macro photography with periodic reviews and supervision.

Tshering arrived in Edinburgh in May 2022 and stayed for one month to receive training ahead of his first period of fieldwork. He received the training on plant photography in different light settings and macrophotography to take high quality photos of floral parts of grasses.

1.3 Organize training programme for Darwin Fellow on database management of graminoid species.

The training also included the use of the Padme database which has been developed at RBGE to manage data used in our taxonomic research, methods of characterisation of grassland ecology and plant photography techniques. Tshering uploaded 1971 specimens into the database during the training period.

Output 2 - Enhanced understanding of the ecology and conservation of temperate rangelands, the biology and identity of key graminoid species, and the threats and opportunities for high-altitude pastoralist communities.

2.1 Conduct one month field study in Dagala region of Bhutan to study the grassland communities to assess the conservation status of graminoid species, and threats and opportunities to livelihoods.

The first fieldwork took place in July 2022, when Tshering conducted a four weeks of ecological sampling and community engagement activities at the study site in Dagala. A total of 20 plots were sampled using the Global Grassy Group protocol. This allowed the team to quantify species composition and the functional diversity across each site. Reference samples amounting to 140 herbarium specimens were collected which will be housed in National Herbarium, Serbithang (THIM), and the Royal Botanic Garden, Edinburgh (E). All graminoid species were photographed to develop identification resources for graminoids in Dagala. (see field report Annex 4.1).

2.2 Collect ecological and population data, and voucher herbarium specimens of at least 30 key graminoids and economically important grassland species of medicinal importance.

The ecological study gathered data on grassland communities, using the methodology developed by Dr Caroline Lehmann's Global Grassy Group (<https://globalgrassygroup.github.io/protocol/>). The data contribute to an under-recorded region in the worldwide dataset of rangelands, placing the Bhutanese ecosystems in a global context. A total of 140 voucher specimens representing 97 species were collected for identification.

2.3 Prepare bilingual identification guides for at least 20 species of graminoids using high quality images using Plants and You format developed at RBGE.

Bilingual identification guides will be prepared in Y2. Approximately 450 photos were taken covering 20 species during the first fieldwork in Y1. More photographs will be taken during the Y2 field work.

2.4 Upload image profiles and occurrence data in PI@ntNet system for at least 20 species of graminoids to improve the identification confidence scores of the PI@ntNet identification app.

Activity for Y2.

Tshering will now return to Bhutan to complete the ecological survey with the sampling of a further 20 plots (Annex 4.1). This will also be part of his MSc summer project, which will look at the response of graminoid species composition to various levels of shrub encroachment. This information will be correlated with soil and biomass data that will be collected during Tshering's fieldwork. This will give new insights into the impact of shrub encroachment on the different forage species, which is now a growing concern in Bhutan (and of the herders) due to the

restriction of the traditional practice of burning rangelands to reduce shrub encroachment and promote the growth of forage species.

Output 3 - Increased community awareness of the importance of rangeland biodiversity, key economically important plant species, and the sustainable management of rangeland resources in the face of invasion by non-native species.

3.1 Conduct awareness raising programme on the importance of rangeland biodiversity and carry out initial baseline and end of year surveys in amongst 50 HH in Dagala region in Bhutan to measure the change at the end of the project.

A one-day consultation meeting was conducted at Dagala Gewog Center in collaboration with officials from Thimphu Forest Division, Social Forestry and Extension Division, and National Biodiversity Center. The meeting was attended by members from the Gewog Administration and about 23 HH. The meeting was convened as a formal introduction of the Darwin Initiative project to the local community. They were appraised of the objectives of the project and the intended activities outlined over the two-year period. A total of 23 HH and members of the Gewog Administration attended the meeting. This was about 58% of the entire yak-herding community of Dagala. The remaining households were still based in the highlands and were unable to travel south to the village centre, which would have taken them two days of walk. However, Tshering and his team were able to meet most of them during his field trip to the study-site (see Output 2).

3.2 Conduct awareness-raising programme including 3 days community workshop for least 50 HH in importance of biodiversity and sustainable management of rangeland resources

Activity for Y2.

3.3 Test and revise prototype bilingual identification guides with the community groups and use the feedback to improve the identification guides developed in Output 2.

Prototype identification guides have been prepared (annex 4.3) and will be tested in Y2.

Output 4 - International collaboration network established by Darwin Fellow with national herbaria, grassland specialists, and experienced Darwin Initiative project partners in India, Nepal and UK (x3) to improve capacity for future research.

4.1 Identify herbarium specimens using the resources in India (CAL), Nepal (KATH) and UK (Natural History Museum, RBG Kew, RBG Edinburgh), and liaising with the grass specialists at these institutions

Preliminary identifications have been carried out at RBGE, of which 113 were identified to species level while another 22 and 5 were identified to genus and family level. A visit to the Natural History Museum, London and the Royal Botanic Garden, Kew is planned for Y2 in summer 2023. At RBGE Tshering has worked on his identifications with Henry Noltie, the author of Flora of Bhutan volume 3 (1994-2000) which covers all graminoid species. He is also in communication with Dr. Chris Stapleton, a bamboo specialist from the UK with wide experience in the Himalayas, including authoring the account in the Flora of Bhutan.

4.2 Gain experience and receive mentorship in biodiversity/poverty alleviation projects from experienced Darwin Initiative project leaders/partners at RBG Kew and RBG Edinburgh

Tshering has been working closely with Flora of Nepal team at RBGE and has learned about the biodiversity conservation projects at Nepal and will receive more mentorship in Y2 from staff at RBG Kew and RBG Edinburgh.

4.3 Work with specialists at RBG Kew (Maria Vorontsova) and RBG Edinburgh (Caroline Lehmann) to improve understanding of grassland ecology, sampling methods, and sustainable management

Tshering has joined Caroline Lehmann's research group and used her Global Grassy Group Protocol in the ecological characterisation at his study site. The protocols are a standardised method of studying grassy ecosystems which are applicable globally.

3.2 Progress towards project Outputs

Output 1 - *Improved national capacity in Bhutan for plant biodiversity research and documentation, enabling the characterisation, identification and effective management of temperate rangeland plant species (grasses, sedges and medicinal plants).*

1.1 Tshering successfully completed all his MSc modules, and has secured good marks in all subjects. The formal and informal training that Tshering has received, and the practical application of that training in his fieldwork in Dagala have already improved his and therefore Bhutan's capacity for plant biodiversity and research in temperate rangelands, since he is mandated to resume his job in Bhutan immediately after the end of this project. He was able to train his colleagues and team members on rangeland research techniques and graminoid identification techniques.

1.2 Tshering has been trained in digital plant photography and has begun to collect images of graminoid species for use in the identification manuals.

1.3 Tshering is now fully trained in the management of data in the Padme database, and has added records of 1971 collections of Bhutanese graminoids.

Output 2 - *Enhanced understanding of the ecology and conservation of temperate rangelands, the biology and identity of key graminoid species, and the threats and opportunities for high-altitude pastoralist communities.*

2.1 During Tshering's fieldwork in June 2022, a total of 20 plots were sampled using the Global Grassy Group protocol. Through this, he and his team were able to collect information of the species composition, ecology, threats and functional diversity in each site. Soil and biomass samples were also collected and analysed at National Soil Service Center for soil and College of Natural Resources respectively.

2.2 There have been no previous scientific studies of the rangelands in Dagala, and Tshering's study has compiled the first checklist of species from these habitats, recording a total of 216 species identified to date. A total of 33 HH have been interviewed which accounts for more than 82% of the total yak-herding community in Dagala.

2.3 Prototype identification guides have been developed and will be tested during the second fieldwork in Y2 Q1 (Annex 4.3)

Output 3 - *Increased community awareness of the importance of rangeland biodiversity, key economically important plant species, and the sustainable management of rangeland resources in the face of invasion by non-native species.*

3.1 The baseline for the level of awareness of rangeland biodiversity was established by carrying out an interview of 23 households. The target in the project proposal was to work with at least 50 HH, but the total number of HH in Dagala is only 40.

3.2 Activity for Y2, but will only be with up to 40 HH

3.3 Activity for Y2

Output 4 - *International collaboration network established by Darwin Fellow with national herbaria, grassland specialists, and experienced Darwin Initiative project partners in India, Nepal and UK (x3) to improve capacity for future research.*

4.1 The main development in Tshering's professional network will take place when the focus of the project shifts from the taught element of the MSc to the subsequent research activities. There has been little progress in grass taxonomy in Bhutan since the publication of Flora of Bhutan volume 3 (Noltie 2000). Tshering has been working closely with the Edinburgh-based members of the Global Grassy Group to ensure that his research protocols are

comparable with global studies of grassy habitats. He has made contact with Dr Maria Vorontsova (Kew) and will visit specialists in Nepal and India during Y2.

4.2 To be assessed at end of Y2.

4.3 To be assessed at end of Y2.

3.3 Progress towards the project Outcome

Indicator 1: Bhutan has increased in-country capacity for post-graduate research in plant biodiversity of rangeland species led by one new MSc graduate, by Y2 Q2

The primary project outcome is to train Tshering to MSc level in taxonomy in a broad range of traditional and modern taxonomic disciplines and associated subjects, and to develop his skills in survey design, analysis of biodiversity data and species distribution modelling. Tshering is working at a high standard on the MSc course, with good results in all his modules and is expected to graduate with at least a high mark, and possibly a distinction.

Indicator 2: Knowledge of rangeland species biodiversity and links with livelihoods enhanced, and species identification tools developed for at least 20 key graminoid species by end of project

The fieldwork in Y1 has generated the first data on the ecology of the Dagala rangelands along with the first checklist of plant species in the area. A total of 216 species were recorded for which 140 herbarium specimens were collected for 97 species. Both field and microscopy photographs have been collected for 30+ graminoid species to develop identification resources for key graminoid species by the end of project.

Indicator 3: Awareness of the value of rangeland biodiversity and its sustainable use enhanced by 75% of at least 50HH (Households) by end of project

Baseline information on the level of awareness of rangeland biodiversity and sustainable use has been established through interviews in Y1. This has given a good insight into areas to focus on for building awareness of local communities in Y2. There has been a good level of community engagement during the first round of fieldwork. As there are only 40 HH in the area this indicator has been modified to recognise the lower number of HH.

The indicators generally appear to be adequate for measuring the intended outcome (although Indicator 3 slightly modified), and the project is on course to deliver all activities and achieve the project outcome on time.

3.4 Monitoring of assumptions

Assumption 1: Darwin Fellow is awarded a UK visa to study at RBGE and work there beyond the end of the MSc.

Comments: Visa application has been successful.

Assumption 2. Darwin Fellow is competent to successfully complete MSc course.

Comments: Tshering has demonstrated clear competence to complete MSc, with his current average mark of 81%.

Assumption 3. Darwin Fellow receives full support from local partners and government authorities.

Comments: All local partners have been fully engaged with the project and some activities in Bhutan have continued after Tshering left to begin his MSc course.

Assumption 4. Travel situation in Bhutan remains stable; Covid 19 and other natural disasters present only short-term disruption.

Comments: Travel restrictions have now been lifted, though some flights are now more expensive than pre-pandemic.

Assumption 5. Local communities in Dagala region in Bhutan actively engage with the training and awareness-raising programme.

Comments: Local communities see the relevance of the project and have responded positively to all activities carried out to date.

Assumption 6. International herbaria in India (CAL), Nepal (KATH) and UK remain open to visitors with only minor disruption due to Covid 19.

Comments: Pandemic restrictions have now been lifted at all herbaria, and there are no longer restrictions to visits.

3.5 Achievement of positive impact on biodiversity and poverty reduction

The main short term benefit of the project is the improvement in the capacity of Tshering to undertake ecological and socioeconomic research in Bhutanese rangelands.

The wider, and longer term, benefit is in the increase in the awareness of biodiversity among the local community, and Tshering has already interacted with 23 households, or 53% of the households in this community (Annex 4.1).

4. Project support to the Conventions, Treaties or Agreements

At this stage of the project there has been no impact on national policy or international biodiversity and development conventions, treaties and agreements.

5. Gender equality and social inclusion

Please quantify the proportion of women on the Project Board ¹ .	40%
Please quantify the proportion of project partners that are led by women, or which have a senior leadership team consisting of at least 50% women ² .	33% - RBGE's senior leadership team has 50% women

There has been a strong participation of women throughout the project planning and implementation process. The heads of the National Biodiversity Center and its division National Herbarium are both headed by women, as well as the representative of the Dagala Block, who all provided critical inputs for the project. The consultation and survey were led by women representation of 50%. Women engagement from the local community was 65% (15 out of 23) with ages ranging from 26 to 78.

6. Monitoring and evaluation

Monitoring and evaluation has been by regular meetings with Tshering to review progress on scheduled activities and receive updates on the marks from the modules on his MSc course. Monitoring and evaluation has been the sole responsibility of RBGE throughout the first year of the project. The indicators of success have been verified according to the log-frame.

7. Lessons learnt

The first year has gone very well, with Tshering proving to be an excellent student who regularly achieves some of the best marks in his class. He is currently on course to graduate

¹ A Project Board has overall authority for the project, is accountable for its success or failure, and supports the senior project manager to successfully deliver the project.

² Partners that have formal governance role in the project, and a formal relationship with the project that may involve staff costs and/or budget management responsibilities.

with a distinction in September 2023. Tshering is a well-motivated, independent researcher and already has a strong support network in Bhutan to allow him to carry out his fieldwork.

8. Actions taken in response to previous reviews (if applicable)

Not applicable

9. Risk Management

No new risks have arisen in the last 12 months, and no adaptations to the project design have been necessary.

Risk Description	Impact	Probability ³	Gross Risk	Mitigation	Residual Risk
Fiduciary: funds not used for intended purposes or not accounted for (fraud, corruption, mishandling or misappropriated).					
Potential risks for funds being misappropriated to other activities from the initially conceived.	Minor	Unlikely	Minor	RBGE is responsible for overall management of funds. A detailed budget plan has been prepared alongside with the project implementation timetable. RBGE procurement policies and procedure ensures that the process is transparent and follow the good practices. Furthermore, the largest outlays will be spent in the UK, so we will have good control over these expenses.	
Safeguarding: 'doing harm' incl. sexual exploitation abuse and harassment, staff safety and welfare, or unintended harm.					
Potential risk of pre-existing exploitation abuse and harassment, staff safety and welfare, or unintended harm between communities	Minor	Rare	Minor	All partners will comply with UK Government's human rights obligations and values and fully meet key principles of ethical implementation of project as suggested by DI guidance document. Project partners will always respect social norms and traditional knowledge and culture of local communities and people.	
Delivery Chain: the overall risk associated with your delivery model					
A reduction of the fund due to the fluctuation in the exchange rate of Pound Sterling to Bhutanese Ngultrum for the field activities in Bhutan.	Minor	Rare	Minor	Most of the funds will be spent in the UK on well-defined expenses, e.g., MSc course fee. For field activities, the impact of the exchange rate is likely to be low and will be monitored closely. If needed a slight adjustment will be made without having a major impact on the project output.	
Risk 4 Contextual: in-country Socio-political events or unrest, or natural disasters.					

³ Likelihood: Almost certain (>80%), Likely (>50%<80%), Possible (>20%<50%), Unlikely (>5%<20%), Rare (<5%)

Potential risk of political unrest, and natural disaster that could affect the field work and travel within Bhutan.	Minor	Rare	Minor	Bhutan is politically stable and the research site is remote, so it is unlikely that civil unrest would affect project activities. The Darwin Fellow and in-country partners already have good connections with these communities, and are well experienced in high-altitude fieldwork.
Risk 5 Operational: internal capacity and capability to manage the project (professional competence, experience and appropriate level of resource in managing programmes and funds).				
A risk of Darwin fellow not successfully completing the MSc	Minor	Rare	Minor	The Darwin Fellow has already proven himself to be a competent candidate for the MSc course. Regular supervision and training will be provided for his course work as well as field work.
Risk 6 Reputational: interventions or delivery partners' actions risk any partner's, including Defra's, reputation.				
High elevation fieldwork incurs risk because of potential adverse weather conditions and remote locations	Severe	Rare	Minor	All team members to be properly equipped with waterproof and warm clothing. Safety briefing to be carried out before fieldwork. No lone working.

10. Other comments on progress not covered elsewhere

Not applicable

11. Sustainability and legacy

The project has been mostly UK-based this year, with relatively little activity in Bhutan apart from the field visit in Y1 Q1, so there have been few opportunities to promote the project there outside the communities in Dagala.

There are currently no plans so make changes to what was originally proposed.

12. Darwin Initiative identity

The project is recognised as a stand-alone project amongst the Bhutanese partners. The Darwin Initiative logo has been used on project materials such as the questionnaire (Appendix 4.1).

13. Safeguarding

Has your Safeguarding Policy been updated in the past 12 months?	No
Have any concerns been investigated in the past 12 months	No

Does your project have a Safeguarding focal point?	No	
Has the focal point attended any formal training in the last 12 months?	n/a	
What proportion (and number) of project staff have received formal training on Safeguarding?	Past: 0% [0] Planned: 0% [0]	
<p>Has there been any lessons learnt or challenges on Safeguarding in the past 12 months? Please ensure no sensitive data is included within responses.</p> <p>The project does not work with young people or vulnerable adults, so safeguarding issues have not arisen</p>		
<p>Does the project have any developments or activities planned around Safeguarding in the coming 12 months? If so please specify.</p> <p>n/a</p>		

14. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2022 – 31 March 2023)

Project spend (indicative) since last Annual Report	2022/23 Grant (£)	2022/23 Total Darwin Initiative Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Monitoring & Evaluation (M&E)				
Others (see below)				
TOTAL	64,890	63433.33	-2.2	

Table 2: Project mobilising of matched funding during the reporting period (1 April 2022 – 31 March 2023)

	Matched funding secured to date	Total matched funding expected by end of project
Matched funding leveraged by the partners to deliver the project.		
Total additional finance mobilised by new activities building on evidence, best practices and project (£)		

15. OPTIONAL: Outstanding achievements or progress of your project so far (300-400 words maximum). This section may be used for publicity purposes

I agree for the Biodiversity Challenge Funds Secretariat to publish the content of this section (please leave this line in to indicate your agreement to use any material you provide here).

File Type (Image / Video / Graphic)	File Name or File Location	Caption, country and credit	Online accounts to be tagged (leave blank if none)	Consent of subjects received (delete as necessary)
				Yes / No
				Yes / No
				Yes / No
				Yes / No
				Yes / No

Annex 1: Report of progress and achievements against Indicators of Success for Financial Year 2022-2023

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
<p>Outcome</p> <p>Enhanced capacity for plant biodiversity research in Bhutan, focussed on the management of high-altitude grasslands, leading to improved livelihoods of pastoralists and the conservation and sustainable use of natural resources.</p>	<ol style="list-style-type: none"> 1. Bhutan has increased in-country capacity for post-graduate research in plant biodiversity of rangeland species led by one new MSc graduate, by Y2 Q2 2. Knowledge of rangeland species biodiversity and links with livelihoods enhanced, and species identification tools developed for at least 20 key graminoid species by end of project 3. Awareness of the value of rangeland biodiversity and its sustainable use enhanced by 75% of at least 50HH 	<ol style="list-style-type: none"> 1. Good progress in MSc, with completion in September 2023 2. Ecological and socioeconomic studies begun. Photographs taken for identification guides. 3. 23 households (53% of HH) engaged in socioeconomic study 	<ol style="list-style-type: none"> 1. Complete MSc studies 2. Complete ecological and socioeconomic studies during summer 2023. Prepare identification guides. 3. Increase the number of HH engaged to at least 75% of total. <p>Use results of field work to develop management plan for Dagala and present to community groups and project partners.</p>
<p>Output 1.</p> <p>Improved national capacity in Bhutan for plant biodiversity research and documentation, enabling the characterisation, identification and effective management of temperate rangeland plant species (grasses, sedges and medicinal plants).</p>	<ol style="list-style-type: none"> 1. Darwin Fellow (Tshering Dorji) successfully completes MSc in Biodiversity and Taxonomy of Plants at RBGE, including a summer research project on Bhutanese high altitude graminoids, by Y2 Q2 2. Darwin Fellow trained in digital plant photography, and high quality digital macro photographs captured for identification manuals of at least 30 graminoid and medicinal plant species by Y2 Q2 3. Darwin Fellow trained in RBGE's in-house specimen management database (Padme) and generating spatial data on plant distribution for at least 20 graminoid species by Y1 Q2 	<ol style="list-style-type: none"> 1. On course to complete MSc 2. Photography training provided, photographs collected for 20 species 3. Padme database training completed. All Bhutanese graminoid specimens at E added to database (1971 specimens). 	

<p>Activity 1.1</p> <p>Enrol Darwin Fellow (Tshering Dorjii) to MSc in Biodiversity and Taxonomy of Plants at RBGE/The university of Edinburgh, and provide support throughout the course. Course option taken through the year included into the student project will be based on those which best support the project outcome</p>	<p>On course to complete</p>	<p>Complete MSc in September 2023</p>
<p>Activity 1.2,</p> <p>Organize training programme for Darwin Fellow in digital plant photography, with particular focus on macro photography with periodic reviews and supervision.</p>	<p>Training completed, with refresher course during MSc teaching</p>	<p>Continue taking pictures in field</p>
<p>Activity 1.3</p> <p>Organize training programme for Darwin Fellow on database management of graminoid species.</p>	<p>Training completed</p>	<p>Continue to use Padme to manage specimen data</p>
<p>Output 2.</p> <p>Enhanced understanding of the ecology and conservation of temperate rangelands, the biology and identity of key graminoid species, and the threats and opportunities for high-altitude pastoralist communities.</p>	<ol style="list-style-type: none"> 1. Pilot study in grassland composition and ecology in the Dagala region of Bhutan conducted to assess conservation and threats to livelihoods and economic opportunities, by Y2 Q1 2. Reference research collections of at least 30 graminoids and economically important medicinal plant species created and preserved at national and international herbaria by Y2 Q3 3. Bilingual identification guides for at least 20 species of graminoids developed using high quality images and the Plants and You style by end of project. 4. Identification confidence scores improved by 50% using the Pl@ntNet app for target 20 graminoid species, by end of project. 	<ol style="list-style-type: none"> 1. Pilot study in Dagala completed 2. Reference research collections made of XX graminoids and economically important medicinal plant species. 3. High quality images for XX species taken. 4. Pl@ntNet testing scheduled for YR2.
<p>Activity 2.1.</p>	<p>Study completed</p>	<p>Follow-up study in summer 2023</p>

Conduct one month field study in Dagala region of Bhutan to study the grassland communities to assess the conservation status of graminoid species, and threats and opportunities to livelihoods.			
Activity 2.2. Collect ecological and population data, and voucher herbarium specimens of at least 30 key graminoids and economically important grassland species of medicinal importance.		Ongoing.	To be completed in summer 2023
Activity 2.3. Prepare bilingual identification guides for at least 20 species of graminoids using high quality images using Plants and You format developed at RBGE		Photographs collected for 20 species	Prepare identification guides
Activity 2.4. Upload image profiles and occurrence data in PI@ntNet system for at least 20 species of graminoids to improve the identification confidence scores of the PI@ntNet identification app.		Photographs not yet uploaded to PI@ntNet	Upload images to PI@ntNet system for at least 20 species of graminoids
Output 3. Increased community awareness of the importance of rangeland biodiversity, key economically important plant species, and the sustainable management of rangeland resources in the face of invasion by non-native species	<ol style="list-style-type: none"> 1. The awareness of the importance of rangeland biodiversity and links with livelihoods increased by 75% for at least 50 HH by end of project (Baseline established Y1 Q2). 2. More than 50 HH participate in workshops providing training in sustainable management of rangeland resources by end of project 3. Bilingual prototype identification guides to 5 sample graminoid species user-tested with community groups by Y2 Q1 	<ol style="list-style-type: none"> 1. Project report: baseline and end of project surveys. Workshop reports. 2. Workshop report. 3. Plants and You user testing report. 	
Activity 3.1		Initial surveys carried out for 23 HH	Carry out surveys at end of YR2

Conduct awareness raising programme on the importance of rangeland biodiversity and carry out initial baseline and end of year surveys in amongst 50 HH in Dagala region in Bhutan to measure the change at the end of the project.			
Activity 3.2 Conduct awareness raising programme including 3 days community workshop for least 50 HH in importance of biodiversity and sustainable management of rangeland resources		Scheduled for YR2	Community workshop at end of YR2
Activity 3.3 Test and revise prototype bilingual identification guides with the community groups and use the feedback to improve the identification guides developed in Output 2		Scheduled for YR2	Test guides with community groups in YR2
Output 4. International collaboration network established by Darwin Fellow with national herbaria, grassland specialists, and experienced Darwin Initiative project partners in India, Nepal and UK (x3) to improve capacity for future research.	<ol style="list-style-type: none"> 1. Expertise of Darwin Fellow in graminoid taxonomy and identification enhanced through study visits to 5 institutions with significant Himalayan graminoid collections and liaising with graminoid specialists in India (CAL), Nepal (KATH) and UK (Natural History Museum, RBG Kew, RBG Edinburgh), by end of project 2. Enhanced capacity in Bhutan for leading on Darwin Initiative projects, by end of project. 3. Improved understanding of grassland ecology, sampling methods, and sustainable management by end of project. 	<ol style="list-style-type: none"> 1. Report by Darwin Fellow with qualitative assessment. 2. Report by Darwin Fellow with qualitative assessment. 2. Report by Darwin Fellow with qualitative assessment. 	
Activity 4.1. Identify herbarium specimens using the resources in India (CAL), Nepal (KATH) and UK (Natural History Museum, RBG Kew, RBG Edinburgh), and liaising with the grass specialists at these institutions	Identifications carried out at E. Visits to other institutions to take place in YR2	Visits to CAL, KATH, BM, K	

<p>Activity 4.2.</p> <p>Gain experience and receive mentorship in biodiversity/poverty alleviation projects from experienced Darwin Initiative project leaders/partners at RBG Kew and RBG Edinburgh</p>	<p>Scheduled for YR2</p>	<p>Set up meetings with mentors in YR2</p>
<p>Activity 4.3. Etc.</p> <p>Work with specialists at RBG Kew (Maria Vorontsova) and RBG Edinburgh (Caroline Lehmann) to improve understanding of grassland ecology, sampling methods, and sustainable management</p>	<p>Ecological sampling programme initiated based on design developed under supervision of Caroline Lehmann and with assistance from her research group.</p>	<p>Complete sampling programme in summer 2023</p>

Annex 2: Project's full current Indicators of Success as presented in the application form (unless changes have been agreed)

Project summary	SMART Indicators	Means of verification
<p>Output 1</p> <p>Improved national capacity in Bhutan for plant biodiversity research and documentation, enabling the characterisation, identification and effective management of temperate rangeland plant species (grasses, sedges and medicinal plants).</p>	<p>1.1 Darwin Fellow (Tshering Dorji) successfully completes MSc in Biodiversity and Taxonomy of Plants at RBGE, including a summer research project on Bhutanese high altitude graminoids, by Y2 Q2</p> <p>1.2. Darwin Fellow trained in digital plant photography, and high quality digital macro photographs captured for identification manuals of at least 30 graminoid and medicinal plant species by Y2 Q2</p> <p>1.3. Darwin Fellow trained in RBGE's in-house specimen management database (Padme) and generating spatial data on plant distribution for at least 20 graminoid species by Y1 Q2</p>	<p>1.1. MSc certificate</p> <p>1.2. Photographs</p> <p>1.3. Database records</p>
<p>Output 2</p> <p>Enhanced understanding of the ecology and conservation of temperate rangelands, the biology and identity of key graminoid species, and the threats and opportunities for high-altitude pastoralist communities.</p>	<p>2.1. Pilot study in grassland composition and ecology in the Dagala region of Bhutan conducted to assess conservation and threats to livelihoods and economic opportunities, by Y2 Q1</p> <p>2.2. Reference research collections of at least 30 graminoids and economically important medicinal plant species created and preserved at national and international herbaria by Y2 Q3</p> <p>2.3. Bilingual identification guides for at least 20 species of graminoids developed using high quality images and the Plants and You style by end of project.</p> <p>2.4. Identification confidence scores improved by 50% using the PI@ntNet app for target 20 graminoid species, by end of project.</p>	<p>2.1. Dagala 2022 Fieldwork report</p> <p>2.2 Reference collections at national and international herbaria, Dagala 2022 Fieldwork report</p> <p>2.3. Plants and You guides and report</p> <p>2.4. PI@ntNet app test report</p>
<p>Output 3</p> <p>Increased community awareness of the importance of rangeland biodiversity, key economically important plant species, and the sustainable management of rangeland resources in the face of invasion by non-native species.</p>	<p>3.1. The awareness of the importance of rangeland biodiversity and links with livelihoods increased by 75% for at least 50 HH by end of project (Baseline established Y1 Q2).</p> <p>3.2. More than 50 HH participate in workshops providing training in sustainable management of rangeland resources by end of project</p>	<p>3.1. Project report: baseline and end of project surveys. Workshop reports.</p> <p>3.2. Workshop report.</p> <p>3.3. Plants and You user testing report.</p>

	3.3. Bilingual prototype identification guides to 5 sample graminoid species user-tested with community groups by Y2 Q1	
<p>Output 4</p> <p>International collaboration network established by Darwin Fellow with national herbaria, grassland specialists, and experienced Darwin Initiative project partners in India, Nepal and UK (x3) to improve capacity for future research.</p>	<p>4.1. Expertise of Darwin Fellow in graminoid taxonomy and identification enhanced through study visits to 5 institutions with significant Himalayan graminoid collections and liaising with graminoid specialists in India (CAL), Nepal (KATH) and UK (Natural History Museum, RBG Kew, RBG Edinburgh), by end of project</p> <p>4.2. Enhanced capacity in Bhutan for leading on Darwin Initiative projects, by end of project.</p> <p>4.3. Improved understanding of grassland ecology, sampling methods, and sustainable management by end of project.</p>	<p>4.1. Report by Darwin Fellow with qualitative assessment.</p> <p>4.2 Report by Darwin Fellow with qualitative assessment.</p> <p>4.3 Report by Darwin Fellow with qualitative assessment.</p>
<p>Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)</p> <p>Output 1</p> <p>1.1 Enrol Darwin Fellow (Tshering Dorjii) to MSc in Biodiversity and Taxonomy of Plants at RBGE/The university of Edinburgh, and provide support throughout the course. Course option taken through the year included into the student project will be based on those which best support the project outcome.</p> <p>1.2 Organize training programme for Darwin Fellow in digital plant photography, with particular focus on macro photography with periodic reviews and supervision.</p> <p>1.3 Organize training programme for Darwin Fellow on database management of graminoid species.</p> <p>Output 2</p> <p>2.1 Conduct one month field study in Dagala region of Bhutan to study the grassland communities to assess the conservation status of graminoid species, and threats and opportunities to livelihoods.</p> <p>2.2 Collect ecological and population data, and voucher herbarium specimens of at least 30 key graminoids and economically important grassland species of medicinal importance.</p> <p>2.3 Prepare bilingual identification guides for at least 20 species of graminoids using high quality images using Plants and You format developed at RBGE.</p> <p>2.4 Upload image profiles and occurrence data in PI@ntNet system for at least 20 species of graminoids to improve the identification confidence scores of the PI@ntNet identification app.</p> <p>Output 3</p>		

3.1 Conduct awareness raising programme on the importance of rangeland biodiversity and carry out initial baseline and end of year surveys in amongst 50 HH in Dagala region in Bhutan to measure the change at the end of the project.

3.2 Conduct awareness raising programme including 3 days community workshop for least 50 HH in importance of biodiversity and sustainable management of rangeland resources.

3.3 Test and revise prototype bilingual identification guides with the community groups and use the feedback to improve the identification guides developed in Output 2.

Output 4

4.1 Identify herbarium specimens using the resources in India (CAL), Nepal (KATH) and UK (Natural History Museum, RBG Kew, RBG Edinburgh), and liaising with the grass specialists at these institutions

4.2 Gain experience and receive mentorship in biodiversity/poverty alleviation projects from experienced Darwin Initiative project leaders/partners at RBG Kew and RBG Edinburgh

4.3 Work with specialists at RBG Kew (Maria Vorontsova) and RBG Edinburgh (Caroline Lehmann) to improve understanding of grassland ecology, sampling methods, and sustainable management

Important Assumptions

1. Darwin Fellow is awarded a UK visa to study at RBGE and work there beyond the end of the MSc.
2. Darwin Fellow is competent to successfully complete MSc course.
3. Darwin Fellow receives full support from local partners and government authorities.
4. Travel situation in Bhutan remains stable; Covid 19 and other natural disasters present only short-term disruption.
5. Local communities in Dagala region in Bhutan actively engage with the training and awareness-raising programme.
6. International herbaria in India (CAL), Nepal (KATH) and UK remain open to visitors with only minor disruption due to Covid 19.

Annex 3: Standard Indicators

Table 1 Project Standard Indicators

DI Indicator number	Name of indicator using original wording	Name of Indicator after adjusting wording to align with DI Standard Indicators	Units	Disaggregation	Year 1 Total	Year 2 Total	Total to date	Total planned during the project
DI-A01	Darwin Fellow (Tshering Dorji) successfully completes MSc in Biodiversity and Taxonomy of Plants at RBGE,	Number of officials from Ministry of Agriculture and Forests receiving training at MSc level	People	Men	1	0	1	1
DI-A01	Darwin Fellow trained in digital plant photography, and high quality digital macro photographs captured for identification manuals of at least 30 graminoid and medicinal plant species by Y2 Q2 1.3.	Number of officials from Ministry of Agriculture and Forests receiving training in plant photography	People	Men	1	0	1	1
DI-A01	Darwin Fellow trained in RBGE's in-house specimen management database (Padme) and generating spatial data on plant distribution for at least 20 graminoid species by Y1 Q2	Number of officials from Ministry of Agriculture and Forests receiving training in database use	People	Men	1	0	1	1
DI-A01	More than 50 HH participate in workshops providing training in sustainable by end of project	Number of HH receive training in sustainable management of rangeland resources	Household	People (gender, age group)	0	50	0	50
DI-C01	Bilingual identification guides for at least 20 species of graminoids developed using high quality images and the Plants and You style	Number of bilingual identification guides for at least 20 species of graminoids developed using high quality images and the Plants and You style published and endorsed.	Number	Identification guides	0	20	0	20
DI-C09	Collect ecological and population data, and voucher herbarium specimens of at least 30 key graminoids and economically important grassland species of	Number of species reference collections made and lodged in National Herbarium	Number	Herbarium specimens	40	30	40	30

DI Indicator number	Name of indicator using original wording	Name of Indicator after adjusting wording to align with DI Standard Indicators	Units	Disaggregation	Year 1 Total	Year 2 Total	Total to date	Total planned during the project
	medicinal importance, by end of project							
DI-C09	Identification confidence scores improved by 50% using the PI@ntNet app for target 20 graminoid species, by end of project.	Number of identification scores on PI@ntNet app improved by 50%	Number	Identification scores	0	20	0	20

Table 2 Publications

Title	Type (e.g. journals, manual, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)
n/a						

Checklist for submission

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