Applicant: **Cowell, Carly**
Organisation: **Royal Botanic Gardens Kew**
Funding Sought: **£19,208.00**

CV19RR\1035

Uncovering the illegal online trade in South African succulents

South Africa has seen a spike in poaching incidents of succulent species and particularly during the Covid-19 pandemic. We aim to use Artificial Intelligence software developed in the FloraGuard project to conduct a mass online search of forums for chats and sales posts to identify possible poaching events and notify law enforcement to act ahead of time. In-country partners will be trained to use this software for continued use and monitoring of poaching in South Africa.

Section 1 - Contact Details

PRIMARY APPLICANT DETAILS

Title	Dr
Name	Carly
Surname	Cowell
Organisation	Royal Botanic Gardens Kew
Tel (Mobile)	[redacted]
Tel (Mobile)	[redacted]
Email (Work)	[redacted]
Address	[redacted]

GMS ORGANISATION

Type	**Charity/ trusts**
Name	Royal Botanic Gardens Kew
Phone (Mobile)	[redacted]
Email (Work)	[redacted]
Website (Work)	[redacted]
Address	[redacted]

Section 2 - Project Title & Previous Applications

Q3. Project Title:

Uncovering the illegal online trade in South African succulents

Q4. Existing project

Q4a. Does your organisation have an existing (or recently finished) project under either Darwin Initiative, Darwin Plus or Illegal Wildlife Trade Challenge Fund?

◉ Yes

If yes, please list the project reference and title of relevant projects (e.g. 25-001, DPLUS090, IWT099).

Reference of current/recent project:	Title of current/recent project:
27-014 EIDPO049 26-024 DPLUS084 25-017	Coffee natural capital for environmental and livelihood sustainability in Uganda ;Sustainable yam markets for conservation and food security in Madagascar; Improving indigenous Bolivian Chiquitano people's livelihoods through sustainable forest management; Identifying and conserving resilient habitats in the British Virgin Islands; Enhancing Rural Caucasian Community Livelihoods through Fruit and Nut Conservation.

Q4b. Is this proposal directly relevant to one of the projects listed above?

⦿ No

Section 3 - Countries, Dates & Budget Summary

Q5. Which Fund's objectives will your project most directly address? (please only select one)

⦿ Illegal Wildlife Trade Challenge Fund

Q6. Country(ies)

Which eligible country(ies) will your project be working in?

Country 1	South Africa	**Country 2**	*No Response*
Country 3	*No Response*	**Country 4**	*No Response*

Do you require more fields?

⦿ No

Q7. Project dates

Start Date:	End date:
04 January 2021	26 March 2021

Q8. Budget summary

Darwin/IWT Funding Request	Total request 2020/21:
Please note all spending must fall between 1st January 2021 - 31st March 2021	19,208.00

Q8a. If any matched funding arrangements are proposed, please detail them here.

RBG Kew £[redacted] Core staff time on the project for subject experts, office and working facilities provided. Access to all collections and relevant databases within Kew.
National Geographic Species Recovery Fund £[redacted] employment of project assistant, travel and accommodation to South Africa and running of final workshop.

Section 4 - Project Outcome and Summary

Q9. Outcome

What is the expected Outcome of this project?

Realtime online searches for sales of endangered succulent species will enable law enforcement to be notified ahead of poaching events and put resources in place to possibly apprehend poachers.

Q10. Summary of project

Please provide a brief summary of your project, its aims, and the key activities you plan on undertaking. Please note that if you are successful, this wording may be used by Defra in communications e.g. as a short description of the project on GOV.UK.

South Africa has seen a spike in poaching incidents of succulent species and particularly during the Covid-19 pandemic. We aim to use Artificial Intelligence software developed in the FloraGuard project to conduct a mass online search of forums for chats and sales posts to identify possible poaching events and notify law enforcement to act ahead of time. In-country partners will be trained to use this software for continued use and monitoring of poaching in South Africa.

Section 5 - Project Partners

Q11. Project partners

Please list all the partners involved (including the Lead Organisation) and provide a summary of their roles. Please upload letters, emails or other confirmation of support from any new partners.

Lead Organisation name:	Royal Botanic Gardens Kew
Other partners involved:	South African partners: South African National Biodiversity Institute (SANBI), Department of Environment, Forestry and Fisheries (DEFF), South African National Parks SANParks), CapeNature. UK Partners: BorderForce

Summary of roles and responsibilities in project:	(Max 150 words) Kew: Project finances and reporting. Analysis and guidance of target searches by the web crawlers, CITES knowledge. Species identification from online images. SANBI: Support from CITES South Africa and range state engagement for listing of species, support on the IUCN Species Survival Commission, undertake Red Listing of target species. Provide staff member for AI and criminology training. DEFF and SANParks: Provide insights into key species being poached from provincial reserves, Namaqua and Richtersveld National Parks, help with the search lexicon for the AI web crawlers and assist with analysis of results. Provide guidance on species being traded illegally and on the ground implementation of results. Provide staff member for AI and criminology training. CapeNature and BorderForce: Verify terminology used in trade. Provide information on operations and seizures in ZA and UK respectively. Main recipients of 'live' data from web searchers of poaching events.
If you have not provided evidence of support from the Lead Organisation or partners above, please explain why:	Letters of support from CapeNature have not yet been received due officers busy with ongoing operations in the field.

Please provide a combined PDF of letters of support from the lead organisation and partner(s) as relevant.

Support letters
29/10/2020
12:41:19
pdf 960.68 KB

Section 6 - Project Staff

Q12. Project staff

Please identify the core staff on this project, their role and what % of their time they will be working on the project. Further information on who should be classified as core staff can be found in the guidance. Please provide a 1 page CV for the proposed Project Leader and any co-Project Leader if relevant.

Name (First name, surname)	Role	% time on project	1 page CV attached?
Carly Cowell	**Project Leader**	20	Checked

David Whitehead	Co-Project leader	70	Unchecked
Laaiqah Jabar	Trained Partner AI user (DEFF)	40	
Tasneem Variawa	Trained Partner AI user (SANBI)	40	

Do you require more fields?

⦿ Yes

Name (First name, surname)	Role	% time on project
Hugo Bezuidenhout	Enforcement and monitoring (SANParks)	20
Carl Brown	Enforcement and monitoring (CapeNature)	20
No Response	*No Response*	0
No Response	*No Response*	0
No Response	*No Response*	0
No Response	*No Response*	0
No Response	*No Response*	0
No Response	*No Response*	0

Please provide 1 page CVs for the proposed Project Leader and any co-Project Leader listed above as a combined PDF.

Ensure the file is named clearly, consistent with the named individual and role above.

CV 1 page-combined
29/10/2020
12:30:22
pdf 280.03 KB

Section 7 - Problem, Method and Change Expected

Q13. Problem the project is trying to address

Please describe the problem your project is trying to address in terms of Covid-19 and its impact on biodiversity or IWT and sustainable livelihoods. For example, what are the drivers of loss of biodiversity that the project will attempt to address? Why are they relevant, for whom? How did you identify these problems? Please cite the evidence you are using to support your assessment of the

problem (references can be listed in an additional attached PDF document).

South Africa is a mega biodiverse country with poaching and illegal harvesting one of the main threats to numerous rare and endemic succulent species in the wild [1]. South Africa has 4337 succulent plants of which 566 are threatened and are listed on the IUCN Red List. Currently, approximately 810 species have trade listed as a threat to their survival in the wild. The project combines innovative and cross-disciplinary ways of analysing online marketplaces for the illegal trade to assist law enforcement in the detection and investigation of poaching events. It is based in the UK, which serves as a major transit and destination market for the European region.
As economies suffer from Covid-19 lockdowns, unemployment figures increase so the number of poaching incidents has increased as people look for alternative means of income (Curtis 2020). Illegal trade routes need to be identified and stopped and sustainable conservation friendly jobs created for those most affected. As South Africa is documented as a current hotspot of plant poaching for the horticultural trade [1,2], focusing efforts on this region are likely to yield significant results, with potential implications for plant conservation both in South Africa, and within the destination countries where illegally collected plants may be trafficked to for sale.

Results from the FloraGuard project [3], which looked at developing automated search tools for identifying online trade in threatened plant species were very successful. When compared to manually searching for online trade, time and effort was significantly reduced as data in orders of magnitude were analysed compared to manual searches in the same period. These tools can now be used to search and identify which endangered succulent species are regularly traded online resulting in illegal harvesting and loss of the species in the wild.

Q14. Methodology

Describe the methods and approach you will use to achieve your intended Outcome. **Provide information on:**

- **How you have analysed historical and existing initiatives and are building on or taking work already done into account in project design. Please cite evidence where appropriate.**
- **The rationale for carrying out this work and a justification of your proposed methodology.**
- **If relevant, how this project links to an ongoing Darwin/IWT project.**
- **How you will undertake the work (materials and methods).**
- **How you will manage the work (roles and responsibilities, project management tools etc.).**

Projects should also consider how best they can address inequality, especially gender inequality, as per the existing guidance for each fund.

Please make sure you read the Guidance Notes, particularly Section 3, before answering this question.

Over the last 60 years, commerce in wild plants increased along with an increase in online trade and on the ground poaching [4]. In South Africa, while the illegal trade in wild animals (and animal parts) is receiving increasing attention, the illegal trade in plants is under-investigated. However, wild plant trafficking threatens and destroys numerous species and important natural resources and hinders the rule of law and security, as profits are also used to finance other forms of trafficking [5,6]. The Internet has increased the illegal trade in wild plants, facilitating the encounter of supply and demand. Digital (AI) tools enabling efficient, targeted searches for real-time online content have been developed. These tools are free but

require expertise to operate. Kew has the expertise to train others to do so, thereby building local capacity in South Africa.

This work will target rare and endemic succulent species in South Africa. These species occur in the arid regions of the country known as the Succulent Karoo Biome spanning three provinces: Northern, Western and Eastern Cape respectively. The focus of traded species appears to be in the Northern and Western Cape, little information is currently available for the Eastern Cape which may have high levels of poaching. An AI tool will crawl and analyse online markets (purposive sampling) trading South Africa succulents. Work will be structured around a digital package developed in the FloraGuard Project [3] to establish Named Entity Directed (NED) Graphs. This will be achieved by crawling data from both the dark web (The Onion Router (TOR)-based forums) and surface web (forums, social media accounts and sales platforms), and performing automated evidence extraction via text analysis and activity profiling. This will produce automated socio-economic and geo-social mapping of transaction activity within online markets. Our bespoke algorithms will be built and refined based on expert knowledge from RBG Kew and Project Partners (DEFF, SANBI, SANParks, UK Border Force). Kew will manage the project finances and reporting, and with assistance from Southampton University will train two female individuals (remote training workshops) already selected by their organisations (DEFF, SANBI) in the use of the digital package.
We will profile socio-economic (supplier/consumer social networks) and geo-social (active location clusters for wildlife trade) patterns associated with the trade in succulent species collected from the wild for sale on the internet and using the NED graphs we will identify species being targeted and possible areas of activity for poaching events. This will be shared with enforcement partners (SANParks, DEFF and CapeNature) to mobilise resources on the ground through their current monitoring patrols and operations.
All search results will be kept on a secure server at RBG Kew and only the trained project partners will be able to access this information. Chain of custody will be overseen by BorderForce UK throughout the project should actions result in criminal prosecutions in South Africa.

Q15. Change expected

Detail the expected changes this work will deliver. You should identify what will change and who will benefit a) in the short-term (i.e. during the life of the project) and b) in the long-term (after the project has ended). Please describe the changes for biodiversity/environment and for people in developing countries, and how they are linked. If you are proposing building on a current or past project, be clear how additional benefits will be delivered through this project.

When talking about people, please remember to give details of who will benefit and the number of beneficiaries expected. The number of communities is insufficient detail – number of households should be the largest unit used. If possible, indicate the number of women who will be impacted.

Connecting entities of interest (People, Objects, Locations, Events) via their online activity will enable specific plant populations at risk of poaching to be identified. This may help in the deployment of immediate interventions, such as targeted ranger monitoring, to provide at risk plant populations with greater protection.
Deepening insights into the actors involved in succulent poaching (e.g. the potential combinations of local and international poachers within supply chains) may highlight locations where Covid-19 related economic hardship has directly led to an increase in succulent poaching during the pandemic. This may help in the development of alternative intervention strategies (e.g. community engagement), that work alongside traditional enforcement practices, to seek ways of reducing local dependency on poaching, and encouraging more sustainable practices.
Longer term, these data could be used to strengthen the motivation for species protection nationally and internationally such as a CITES Appendix III listing or higher. Findings will also be integrated into Red List

assessments.

If necessary, please provide supporting documentation e.g. maps, diagrams, references etc., as a PDF using the File Upload below:

Named Entity Directed Graphs_RSA_Proposal_Upload
29/10/2020
11:25:34
pdf 353.64 KB

IWT References
29/10/2020
11:25:20
pdf 62.69 KB

Section 8 - Aims, Objectives and Exit Strategy

Q16. Aims and objectives

Clearly outline the aim and objectives of the project and how the achievement will be measured. Use SMART objectives if possible.

The objectives of the project are to: 1) establish which species are frequently traded; 2) determine which countries they are being traded in, 3) establish whether possible collection/poaching events are going to take place, and 4) build capacity in the UK and South Africa to use AI tools to monitor online trade in threatened species.
Training on use of AI tools for two in-country female practitioners and one UK researcher. Criminology analysis training for AI trained recipients and an additional six in-country partner staff, all of whom will be from disadvantaged backgrounds. Using a baseline of three forums, volumes will be a minimum of two GBytes of data per target species with 150,000 per forum (HTML posts with optional images), 20,000 profile HTML pages with profile images and 40,000 social media posts crawled for online posts. Data dumps will take the form of HTML forum dumps (~120Mbytes per virtual community) and JSON social media post dumps (~10Mbytes per virtual community). The use of HTML and JSON digital formats is standard for forums and social media sites, based on previous experience in the FloraGuard project.
Target species will be selected from 2000 species records of South African succulents, the first AI crawl will be for the genus Conophytum, from records obtained from SANBI, SANParks and DEFF.
Research evidence base made available to law enforcement for anti-poaching operations and cases following chain of custody for secure evidence.
Database of 20 international experts established to provide ongoing expertise and advice on a secure online site with signed agreements by experts. A general guideline document published for ongoing support.

Q17. Exit strategy

State how the project will reach a stable and sustainable end point, and explain how the outcomes will be sustained, either through a continuation of activities, funding and support from other sources or because the activities will be mainstreamed in to "business as usual".

The theory of train the trainers will be used so that more conservation staff in South Africa can be trained on the AI tools. As the software is free, further training tools and a database of conservation science experts will be established to be virtually consulted to support the ongoing enforcement of illegal trafficking of plant species. Additional funding and support will be sought for continued work on South African succulents in trade. Working in conjunction with the South African CITES Scientific Authority the listing of

succulent species on CITES Appendices will be investigated in advance of the next CITES Conference of the Parties.

Section 9 - Budget

Q18. Budget

Provide a detailed breakdown of costs to be funded by the Darwin Initiative/Darwin Plus/IWT Challenge Fund in GBP.

See Finance for Darwin/IWT **for which costs sit under which budget line.**

Budget Line	Cost in £ (GBP)
Staff costs	[redacted]
Consultancy costs	[redacted]
Overhead costs	[redacted]
Travel and subsistence	0
Operating costs	0
Capital equipment*	[redacted]
Other costs	0
Total (Must be less than or equal to £60,000)	19,208.00
***If you are proposing to purchase any capital items over £1,000 please detail these here and provide justification below**	A desktop with 32 Gbytes RAM, 2 GHz CPU, 2 Tbyte disk is required to host the social media and dark web crawls, and associated analytics software. This is essential equipment, as working with large volumes of data and storing data securely cannot be achieved with laptop hardware. A strict HTML metadata + text storage only policy will be applied. Browsing images/videos content will never be saved to disk. This will avoid all the ethical issues of storing images on computers, especially since the crawler to do it without human eyes checking the images. This has to be stand-alone hardware for security purposes.

Q19. Financial Risk Management

This question considers the financial risks to the project. Explain how you have considered the risks and threats that may be relevant to the successful financial delivery of this project. This includes risks such as fraud or bribery, but may also include the risk of fluctuating foreign exchange and

internal financial processes such as storage of financial data.

In light of South Africa's corruption index rating of 44 out of 100, ranking South Africa 70 out of 180 countries. Funding will be held at Kew and all payments will be done through its financial department, this will minimise the risk of fraud or bribery. Training will be provided by experts based in the UK and EU and there is little risk of exchange rate fluctuating.

Q20. Capital items

If you plan to purchase capital items with Darwin/IWT funding, please indicate what you anticipate will happen to the items following project end. If you are requesting more than 10% capital costs, please provide your justification here.

Computer equipment purchased will be retained for the use of online searches using the AI software for ongoing monitoring and support for anti-poaching operations.

Q21. Value for Money

Please describe why you consider your application to be good value for money including justification of why the measures you will adopt will secure value for money.

Wildlife crime linked to the Internet is of growing concern to conservation organisations around the world. The FloraGuard technique provides a means of both detecting evidence of IWT online and translating these results into more efficient on-the-ground interventions. Training a team of experts capable of training others, developing guidelines for replicable best practice techniques, and releasing any software developments as open source, offer means of scaling this approach to IWT monitoring enforcement in future, both in South Africa and in other IWT hotspots around the World.
Our approach has potential applications for other forms of online criminality (e.g. illicit drugs and human trafficking). The data collected will be released to authorised parties, so that law enforcement and cyber-security professionals in areas other than the illegal wildlife trade can build upon our work.

Section 10 - Ethics and Safeguarding

Q22. Ethics

Outline your approach to meeting Darwin/IWT's key principles for ethics as outlined in the guidance note. Additionally, are there any human rights and/or international humanitarian law risks in relation to your project? If there are, have you carried out an assessment of the impact of those risks, and of measures that may be taken in order to mitigate them?

The extraction of online data will initially target public facing online sites and will observe all relevant local data protection laws (UK – GDPR, South Africa – POPIA). Partnering with law enforcement agencies will ensure that advice on and permission for the extraction data from more sensitive online sources is correctly managed and conducted. The results of data searchers contained within any publications will be pseudonymised, with data of potential interest to enforcement agencies handled in accordance with their own legal parameters, guidance and best practice techniques.

Q23. Safeguarding

Projects funded through the Darwin Initiative/IWT Challenge Fund must fully protect vulnerable people all of the time, wherever they work. In order to provide assurance of this, projects are required to have appropriate safeguarding policies in place. The award Terms and Conditions set out clear requirements on safeguarding. Please confirm you have read and understand these and that you comply with them all.

Checked

Section 11 - Key Milestones

Q24. Provide an overview of your proposed project, outlining key milestones.

N.B. This should cover the period of your requested project only and the start/end dates should match with those provided in Question 7.

Date	Key Milestone
04 January 2021	START
04 January 2021	Weekly team meetings to liaise with law enforcement and project partners
04 January 2021	Preparation, equipment purchase and design work for target species
11 January 2021	AI Training and contact international experts to establish database for advice and support.
14 January 2021	Setup secure site via Kew IT for expert group.
15 January 2021	Criminology training
20 January 2021	First online search and data collection for Conophytum spp Agreements signed by experts.
21 January 2021	Ongoing data analysis as posts are returned by AI tool.

01 February 2021	Second online search and data collection for other target species identified
15 February 2021	Third online search and data collection for other target species identified
22 March 2021	A general guideline document published for ongoing support.
No Response	*No Response*
31 March 2021	FINISH

Section 12 - Certification

Q25. FCDO notifications

Please check the box if you think that there are sensitivities that the Foreign, Commonwealth and Development Office will need to be aware of should they want to publicise the project's success in the Darwin/IWT competition in the host country.

Checked

Please indicate whether you have contacted your Foreign Ministry or the local embassy or High Commission (or equivalent) directly to discuss security issues (see Guidance Notes) and attach details of any advice you have received from them.

◉ No

Q26. Certification

On behalf of the

trustees

of

Royal Botanic Gardens Kew

I apply for a grant of

£19,208.00

I certify that, to the best of our knowledge and belief, the statements made by us in this application are true and the information provided is correct. I am aware that this application form will form the basis of the project schedule should this application be successful.
(This form should be signed by an individual authorised by the applicant institution to submit applications and sign contracts on their behalf.)

- **I have enclosed a CV for the Project Leader/co-PL and letters or confirmation of support (uploaded at appropriate points in application)**

  Checked

Name	Clive Hayter
Position in the organisation	Head of Office of the Science Directorate
Signature (please upload e-signature)	Signature_Clive 29/10/2020 15:21:15 pdf 27.36 KB
Date	29 October 2020

Section 13 - Submission Checklist

Checklist for submission

	Check
I have read the Guidance, including the "Guidance Notes for Applicants**" and "**Finance for Darwin and IWT Challenge Fund**".**	Checked
I have read, and can meet, the current Terms and Conditions for the relevant fund.	Checked
I have provided actual start and end dates for my project.	Checked
I have provided my budget in GBP.	Checked
The application has been signed by a suitably authorised individual (clear electronic or scanned signatures are acceptable).	Checked
(If copying and pasting into Flexi-Grant) I have checked that all my responses have been successfully copied into the online application form.	Checked
I have included a 1 page CV for the Project Leader (and co-Project Leader if relevant).	Checked
I have included a letter or electronic confirmation of support from the lead organisation and main partner organisation(s) identified at Question 11, or an explanation of why not.	Checked

I have checked the website on GOV.UK **immediately prior to submission to ensure there are no late updates.**	Checked
I have read and understood the Privacy Notice on GOV.UK**.**	Checked

Data protection and use of personal data

Information supplied in this application form, including personal data, will be used by Defra as set out in the latest copy of the Privacy Notice for Darwin, Darwin Plus and the Illegal Wildlife Trade Challenge Fund available here. This Privacy Notice must be provided to all individuals whose personal data is supplied in the application form. Some information may be used when publicising the Darwin Initiative including project details (usually title, lead organisation, location, and total grant value) on the GOV.UK and other websites.

Information relating to the project or its results may also be released on request, including under the 2004 Environmental Information Regulations and the Freedom of Information Act 2000. However, Defra will not permit any unwarranted breach of confidentiality nor will we act in contravention of our obligations under the General Data Protection Regulation (Regulation (EU) 2016/679).