



Submit by 2359 GMT on Monday 29 January 2018

Darwin Initiative Application for Grant for Round 24: Stage 2

Before completing this form, please read both the Fair Processing Notice on pages 17 and 18 of this form and the [Guidance](#). Where no word limits are given, the size of the box is a guide to the amount of information required. Information to be extracted to the database is highlighted blue. Blank cells may render your application ineligible

Eligibility

1. Name and address of organisation

(NB: Notification of results will be by email to the Project Leader in Question 6)

Applicant Organisation Name:	Natural History Museum
Address:	
City and Postcode:	
Country:	
Email:	
Phone:	

2. Stage 1 reference and Project title

Stage 1 Ref: 4200	Title (max 10 words): Biodiversity and Agriculture: addressing scale insect threats in Kenya
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3. 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](#). Please bear this in mind, and write this summary for a non-technical audience.

(max 80 words)

Scale insect pests damage native trees and crops in Kenya, causing up to 91% crop losses, but awareness of the threats they pose is low because they are small and cryptic. Local entomologists cannot identify scales so pesticides are misused, killing natural enemies and causing more pest problems. Taxonomic training, and information packages for each community, will enable better pest management strategies. Building identification capacity throughout the decision chain will reduce improper practices and speed up responses to pest invasions.

4. Country(ies)

Which eligible host country(ies) will your project be working in? You may copy and paste this table if you need to provide details of more than four countries.

Country 1: Kenya	Country 2:
Country 3:	Country 4:

5. Project dates, and budget summary

Start date: 1 July 2018		End date: 31 March 2021		Duration: 2 years 9 months	
Darwin funding request (Apr – Mar)	2018/19 £71,803	2019/20 £84,703	2020/21 £80,152	Total £236,658	
Proposed (confirmed & unconfirmed) matched funding as % of total Project cost					%

6. Partners in project. Please provide details of the partners in this project and provide a CV for the individuals listed. You may copy and paste this table if necessary.

Details	Project Leader	Project Partner 1	Project Partner 2
Surname	Ouvrard	Watson	Kinuthia
Forename (s)	David	Gillian	Wanja
Post held	Researcher – Agricultural Entomologist	Senior Insect Biosystematist (Emeritus)	Senior Research Scientist
Organisation (if different to above)			National Museums of Kenya (NMK)

Details	Project Partner 3	Project Partner 4	Project Partner 5
Surname	Nderitu	Kasina	Mutitu
Forename (s)	John	Muo	Eston
Post held	Associate Professor in Agricultural Entomology	Centre Director, Economic Entomologist	Principal Forest Entomologist
Organisation (if different to above)	University of Nairobi (UoN)	Kenya Agricultural and Livestock Research Organisation (KALRO)	Kenya Forestry Research Institute (KEFRI)

Details	Project Partner 6	Project Partner 7	Project Partner 8
Surname	Kibwage	Mulema	Kansiime
Forename (s)	Pamela	Joseph	Monica
Post held	Chief Inspector	Plantwise Regional Support Manager	Agricultural Economist, Scientist Seed Systems
Organisation (if different to above)	Kenya Plant Health Inspectorate Service (KEPHIS)	CABI	CABI

7. Has your organisation been awarded a Darwin Initiative award before (for the purposes of this question, being a partner does not count)?

If so, please provide details of the most recent awards (up to 6 examples).

Reference No	Project Leader	Title
DPLUS068	Juliet Brodie	Building foundations to monitor and conserve Falklands marine forest habitats
18010	Alex Monro	Tools for the sustainable harvesting of Mayanut (Mesoamerica)
EIDPS042	Pierre du Plessis	n/a (fellowship)
DARSC175	David Ouvrard	Biodiversity and Agriculture: addressing scale insect threats in Kenya

8a. If you answered 'No' to Question 7 please complete Question 8a, b and c.

If you answered 'Yes', please go to Question 9 (and delete the boxes for Q8a, 8b and 8c)

What year was your organisation established/ incorporated/ registered?	
What is the legal status of your organisation?	NGO Yes/No Government Yes/No University Yes/No Other (explain)
How is your organisation currently funded?	(Max 100 words)
Have you provided the requested signed audited/independently examined accounts?	Yes/No

8b. Do not complete if you answered 'Yes' to Question 7.

Provide detail of 3 contracts/awards held by your organisation that demonstrate your credibility as an organisation and provide track record relevant to the project proposed. These contracts/awards should have been held in the last 5 years and be of a similar size to the grant requested in your Darwin application.

1. Title	
Value	
Duration	
Role of organisation in project	
Brief summary of the aims, objectives and outcomes of the	

contract/award.	
Client/ independent reference contact details (Name, e-mail, address, phone number).	

2. Title	
Value	
Duration	
Role of organisation in project	
Brief summary of the aims, objectives and outcomes of the contract/award.	
Client/ independent reference contact details	

3. Title	
Value	
Duration	
Role of organisation in project	
Brief summary of the aims, objectives and outcomes of the contract/award.	
Client/ independent reference contact details	

8c. Do not complete if you answered 'Yes' to Question 7.

Describe briefly the aims, activities and achievements of your organisation. (Large organisations please note that this should describe your unit or department)

Aims (50 words)
Activities (50 words)
Achievements (50 words)

9. Please list all the partners involved (including the Lead Institution) and explain their roles and responsibilities in the project. Describe the extent of their involvement at all stages, including project development. This section should illustrate the capacity of partners to be involved in the project. Please provide written evidence of partnerships. Please copy/delete boxes for more or fewer partnerships.

<p>Lead institution and website: Natural History Museum www.nhm.ac.uk</p>	<p>Details (including roles and responsibilities and capacity to lead the project): (max 200 words)</p> <p>The Natural History Museum, whose missions are to describe biodiversity and provide solutions for a sustainable future, leads several projects aimed at securing food, health and natural materials, using its vast collections and unique research expertise. It has led many Biodiversity survey and conservation projects, and is experienced in monitoring and evaluating large-scale international development programmes like DeWorm3 (funded by the Gates Foundation).</p> <p>Granted a Scoping award in May 2017, the NHM had a major role in developing the current project, and building a consortium of partners able to achieve ambitious aims in capacity building at key levels of the pest management decision chain.</p> <p>NHM staff will supervise the project management, with researchers providing (1) scale insect taxonomic expertise (using its collection of 75,000 specimens representing about 76% of the world fauna), training and technical advice on specimen preparation, pest identification and management; and (2) guidance on monitoring the short- to medium-term economic impacts of the study on crop production and overall local biodiversity. NHM staff will ensure that longer-term capacity (databases, digitised specimens and reference collection) are in place when the project is complete, giving a geographically larger and temporally longer timespan to its deliveries.</p>
<p>Have you included a Letter of Support from this institution? If not, why not?</p>	<p>Yes</p>

<p>Partner Name and website where available:</p> <p>National Museums of Kenya (NMK)</p> <p>www.museums.or.ke</p>	<p>Details (including roles and responsibilities and capacity to engage with the project): (max 200 words)</p> <p>The NMK is the national custodian of biodiversity and advises Kenyan government ministries and institutions dealing with forestry, wildlife, invasive species, fisheries, quarantine and mining, on biodiversity conservation, specimen identification, and biodiversity databasing, as well as species distribution and mapping, in support of fulfilling national and international agenda.</p> <p>NMK successfully organised the scoping meeting in June 2017 and will coordinate the project in Kenya, ensuring that all local collaborators are working together, in line with the NHM in London, to deliver the agreed objectives. NMK will lead the organisation of training courses and augmentation of the national scale insect reference collection, including digitisation and databasing.</p> <p>Dr Wanja Kinuthia, Research Scientist and Project Manager, will provide management support, ensuring that milestones and aims are met through the engagement of all local partners. She will work closely with Mr Morris Mutua, field assistant, to coordinate field activities, and ensure that specimens are appropriately sorted, identified and entered in the NMK invertebrate collection. Mr Josiah Achieng will provide assistance on databasing.</p>
<p>Have you included a Letter of Support from this institution? If not, why not?</p>	<p>Yes</p>

<p>Partner Name and website where available:</p> <p>University of Nairobi (UoN)</p> <p>www.uonbi.ac.ke</p>	<p>Details (including roles and responsibilities and capacity to engage with the project): (max 200 words)</p> <p>The University of Nairobi (UoN) is a public university that has a leading and vibrant Faculty of excellence in education, training and research in sustainable agriculture, food, nutrition, environmental sciences and crop protection.</p> <p>UoN will train a graduate student in field surveying, data collection, results analysis and report writing, and will build technical staff capacity in scale insect slide mounting and identification.</p> <p>Prof. John Nderitu, Agricultural Entomologist, will ensure that the graduate student's MSc project is successful, with collecting trips, scale insect collection, preservation and data management protocols strictly followed. Prof. Nderitu will provide assistance with capacity building among technicians and extension workers. Mr Joel Aura, Chief Technologist from the department of plant Science and Crop Protection, is an experienced insect taxonomist and will support the training of the postgraduate student and the training of farmers in the field and extension staff in the laboratory.</p> <p>UoN has been participating in several projects dealing with agricultural development, like the reduction in the use of synthetic pesticides by integrating biological pesticides into IPM programmes. UoN also actively participated to the scoping meeting in June 2017.</p>
<p>Have you included a Letter of Support from this institution? If not, why not?</p>	<p>Yes</p>

<p>Partner Name and website where available: Kenya Agricultural and Livestock Research Organisation (KALRO) www.kalro.org</p>	<p>Details (including roles and responsibilities and capacity to engage with the project): (max 200 words)</p> <p>KALRO's mandate is to promote, streamline, coordinate and regulate all aspects of research in agricultural and livestock development and to promote the application of research findings and technologies in Kenya. It is the government agency responsible for crops and livestock research, agricultural technology and innovation generation, and developing mechanisms for their utilization. KALRO has about 60 centres and sub-centres across the country, and staff dedicated to pest research.</p> <p>KALRO will lead the social survey of smallholder farmers and extension workers, who form the bulk of KALRO target clients, to enable 1) documentation of the perception and knowledge of scale insects in Kenya, disaggregated by stakeholder group; and 2) track the impact on livelihoods of the developed measures for management of scale insect pests.</p> <p>Dr Muo Kasina, Agricultural Entomologist and Centre Director, will ensure that the socio-economic study will provide the necessary information to improve pest management strategies at the smallholder social level, local livelihoods and biodiversity.</p> <p>KALRO actively participated in the scoping meeting in June 2017.</p>
<p>Have you included a Letter of Support from this institution? If not, why not?</p>	<p>Yes</p>

<p>Partner Name and website where available:</p> <p>Kenya Forestry Research Institute (KEFRI)</p> <p>www.kefri.org</p>	<p>Details (including roles and responsibilities and capacity to engage with the project): (max 200 words)</p> <p>KEFRI is the state corporation researching forestry and allied natural resources. It researches on Forest Productivity and Improvement; Biodiversity and Environment Management; Forest Product Development; and Socio-economics, Policy and Governance. KEFRI has six regional forestry research programmes in ecologically strategic locations, and will implement this project forestry mandate using these centres.</p> <p>KEFRI will lead the social survey of smallholder-foresters, and field surveys in forestry environments; support technical and advisory training of extension workers; and report on improvement in smallholder-forester livelihoods and the increase in biodiversity in studied areas.</p> <p>Dr Eston Mutitu, Principal Research Scientist and Forest Entomologist, will ensure that the socio-economic study will provide information to improve pest management strategies at the smallholder level and improve local livelihoods and biodiversity. Particular attention will be paid to invasive species that put endemic species diversity at risk and reduce smallholder-forester income. He will work closely with foresters, centre program scientists, and technicians in delivering the project outputs.</p> <p>The current studies of biodiversity by KEFRI in key Water Towers areas of Mt. Elgon and Cherangani hills will be used to enhance pests and diseases management in the farmlands leading to poverty alleviation. KEFRI actively participated in the scoping meeting in June 2017.</p>
<p>Have you included a Letter of Support from this institution? If not, why not?</p>	<p>Yes</p>

<p>Partner Name and website where available: Kenya Plant Health Inspectorate Service (KEPHIS) www.kephis.org</p>	<p>Details (including roles and responsibilities and capacity to engage with the project): (max 200 words)</p> <p>KEPHIS is the Kenya National Plant Protection Organization (NPPO) with a mission to provide a science-based regulatory service assuring the quality of agricultural inputs and produce, promoting food security and sustainable development.</p> <p>KEPHIS staff will participate actively in the field surveys, and together with NMK, in writing a policy brief that will summarise all findings and recommendations regarding the management of scale insects in Kenya, and the roles of such a programme in alleviating poverty and preserving biodiversity.</p> <p>Mrs Pamela Kibwage, Chief Inspector, will ensure that collecting trips are successful, with insect preservation and data management protocols strictly followed. She will be responsible for updating the Kenyan checklist of scale insects. Other staff to be involved are; Dr Isaac Macharia, General Manager-Phytosanitary Services, who will take lead in the policy issues and communication with the Ministry of Agriculture, Helen Heya, entomologist, who will assist Gillian Watson in the diagnostic activities as well as participate in surveillance activities.</p> <p>KEPHIS actively participated in the scoping meeting in June 2017.</p>
<p>Have you included a Letter of Support from this institution? If not, why not?</p>	<p>Yes</p>

Partner Name and website where available: CAB International (CABI) www.cabi.org	<p>Details (including roles and responsibilities and capacity to engage with the project): (max 200 words)</p> <p>CABI is a global, intergovernmental, not-for-profit organization whose aim is to improve people's lives worldwide by providing information and applying scientific expertise to solve problems in agriculture and environment. The CABI team comprises expertise in biological, communications and social sciences.</p> <p>CABI provided technical support in project design by actively participating in the scoping meeting in June 2017, and will take the lead in developing 'fit for purpose' information materials to engage smallholder farmers, foresters and extension workers, the public and policy makers in appropriate management of scale insects. CABI will also provide technical support in conducting the social surveys.</p> <p>Dr Monica Kansime, Agricultural Economist, and Dr Joseph Mulema, Plantwise Regional Support Manager, will lead activities on the development of communication material. They will be responsible for transmitting all necessary materials to farmers and foresters through extension services, and for monitoring the improvement of livelihoods through a post-project survey. Other staff to be included on the project are; James Watiti, Development, Communication and Extension specialist, and Abigael Mchana, Communications Assistant.</p>
Have you included a Letter of Support from this institution? If not, why not?	Yes

10. Key Project personnel

Please identify the key project personnel on this project, their role and what % of their time they will be working on the project. Please provide 1 page CVs for these staff, or a 1 page job description or Terms of Reference for roles yet to be filled. Please include more rows where necessary. These should match the names and roles in the budget spreadsheet.

Name (First name, surname)	Role	Organisation	% time on project	1 page CV or job description attached*?
David Ouvrard	Project Leader	NHM	17.33%	Yes
Gillian Watson	Senior Insect Biosystematist and Biodiversity Officer	NHM	50%	Yes
Wanja Kinuthia	Local coordinator; biodiversity monitoring	NMK	30%	Yes
John Nderitu	Field survey coordinator and student supervision	UoN	10%	Yes
Muo Kasina	Social survey coordinator;	KALRO	20%	Yes

	livelihoods monitoring			
Eston Mutitu	Forestry research and implementation coordinator	KEFRI	30%	Yes
Pamela Kibwage	National list and policy coordinator	KEPHIS	15%	Yes
Joseph Mulema	Communication and Dissemination coordinator	CABI	10%	Yes
Monica Kansiiime	Socioeconomics coordinator	CABI	10%	Yes
Andrew Polaszek	Natural enemies and Biocontrol expert	NHM	5.33%	Yes
Ian Kitching	Monitoring and Evaluation	NHM	5.33%	Yes
*If you cannot provide a CV, please explain why not.				

11. Problem the project is trying to address

Please describe the problem your project is trying to address in terms of biodiversity and its relationship with poverty. 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?

(Max 300 words)

A Kenyan working group on invasive species and vulnerable ecosystems (KEPHIS, KALRO, KEFRI) has identified a need for increased in-country capacity to identify and monitor threats to biodiversity and livelihoods.

The (incomplete) list of scale insects of Kenya shows 66 potential pests (most non-native) out of 227 species (29%); this level is much higher than in any other group of insects (<1% for all other insects combined). Recent outbreaks of alien scale pests have occurred in countries neighbouring Kenya; within the country more scale species have become invasive, impacting a wider range of crops and causing yield losses of up to 91% (Macharia *et al.*, 2017). This puts smallholder farmers and foresters at high risk of yield and income loss; however, their awareness of the growing risk is low to non-existent.

It is the poorest people who are most dependant on growing subsistence crops. Massive untargeted pesticide application to try to control scale pests can exacerbate pest problems by reducing biodiversity through the elimination of natural enemies. It raises production costs, resulting in smallholder debt; there are also negative impacts on human health, local biodiversity and the environment such as water quality.

Biological pest control (as part of Integrated Pest Management) facilitates long-term reduction in pesticide use, so improving farm income, natural enemy diversity, and reducing pest problems. Many scale insects have host-specific parasitoids suitable as biocontrol agents, but the development of biological control requires accurate identification of the pest species. Some past attempts at biological control failed due to misidentifications resulting in misdirected pest control efforts, e.g. 15 years elapsed time between the outbreak and control of the coffee mealybug, and 80% production loss over <10 years caused by cassava mealybug. Currently taxonomic expertise on scale insects and tailor-made identification aids are not available in Kenya.

12a. Biodiversity Conventions, Treaties and Agreements

Your project must support the objectives of one or more of the agreements listed below. Please indicate which agreement(s) will be supported and describe which objectives your project will address and how. Note: projects supporting more than one will not achieve a higher score.

Convention On Biological Diversity (CBD)	Yes
Nagoya Protocol on Access and Benefit Sharing (ABS)	No
International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)	No
Convention on International Trade in Endangered Species (CITES)	No

12b. Biodiversity Conventions

Please detail how your project will contribute to the objectives of the agreement(s) your project is targeting. You should refer to Articles or Programmes of Work here. Note: No additional significance will be ascribed for projects that report contributions to more than one agreement

(Max 500 words)

This study will contribute directly to articles 6 (*General Measures for Conservation and Sustainable Use*), 7 (*Identification and Monitoring*), 12 (*Research and Training*) and 13 (*Public Education and Awareness*) of the CBD. Kenya recognises several drivers of change to biodiversity in the country in the context of the CBD; inadequate involvement of local communities, invasive species, unsustainable agricultural development, chemical overload causing unacceptable loss of pollinators and other biodiversity, and land degradation and pollution occasioned by poor land-use practices. Our objectives are to reduce these pressures on Kenyan biodiversity, in line with the National Biodiversity Strategy and Action Plan objectives 5 (*Strengthen national capacity for monitoring and evaluation of biodiversity*), 16 (*Strengthen national capacity for research and training, technical and scientific cooperation, and biotechnology*), 17 (*Strengthen national programmes for public education, awareness and exchange of information*) and 20 (*Strengthen conservation and sustainable utilization of agricultural biodiversity for food and agriculture*).

Several objectives in our study will support these Kenyan national goals:

1. Target groups have a better understanding of biodiversity issues linked to unsustainable agricultural activities.
2. Local researchers, biologists and extension workers develop appropriate taxonomic skills through training and can rely on relevant sustainable infrastructures (reference collections, databases, national facilities) to identify and monitor agro-biodiversity.
3. Stakeholders implement environmentally friendly practices and manage scale insect pests with sustainable methods.

As stated in Kenya's 5th National Report to the COP of the CBD, "there is need for a rapid invertebrate assessment in key habitats where no records exist". We aim to address this through surveying scale insects and their natural enemies in chosen agro-ecosystems. The report also highlights the deleterious environmental effect of pesticide use against insect pests. We aim to address this through engagement of all stakeholders in reducing use of pesticides and preserving the local biodiversity for improving ecosystem services to the community.

This project supports also national goals which have been recently proposed by the Kenyan government to achieve Aichi targets: *make the population aware of biodiversity issues and the*

steps to be taken to conserve and use it sustainably; increase capacity to identify Invasive Alien Species (IAS) to 100 personnel to enhance surveillance and monitoring of IAS pathways. Two of our activities will help in achieving these goals:

1. Develop a large range of communication products, including through mass media, to reach a large proportion of the population.
2. Train researchers, parataxonomists and extension officers in identifying and monitoring invasive scale insect species.

The Centre for Biodiversity has been set up at the National Museums of Kenya (NMK) for addressing CBD activities, through coordination of studies and implementation of actions using multilateral environmental agreements. In this project, NMK will therefore be the relevant intermediary to advise government ministries about biodiversity preservation through the policy brief this study will produce on sustainable pest management strategy to be implemented in the country.

12c. Is any liaison proposed with the CBD / ABS / ITPGRFA / CITES focal point in the host country?

Yes **No** **if yes, please give details:**

Mr Charles T. Sunkuli, Principal Secretary and CBD National Focal Point for Kenya, sent a letter of support. Liaison with Mr Sunkuli has been established by NMK (Dr Wanja Kinuthia) and KEFRI (Dr Eston Mutitu), who will report regularly to the CBD National Focal Point at the Kenyan Ministry of Environment and Natural Resources on the project progress with regard to agro-biodiversity sustainability.

12d. Global Goals for Sustainable Development (SDGs)

Please detail how your project will contribute to the Global Goals for Sustainable Development (SDGs).

(Max 250 words)

In implementing resilient agricultural practices that increase smallholders' income and preserve land and soil quality, this study directly addresses the UN Sustainable Development Goals 2 (Zero hunger) and 15 (Life on land).

In developing extension services and increasing knowledge among smallholder farmers and foresters in this project, we directly help towards addressing the goal of *doubling the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers* (Goal 2 target).

In disseminating information on best practice for managing scale insect pests, we directly help towards addressing the goal of *ensuring sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality* (Goal 2 target).

In determining the threat to crops and indigenous plants, especially forest trees, by invasive scale insects, and in establishing up-to-date pest and quarantine national lists, this study directly helps towards addressing the goal of *introducing measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species* (Goal 15 target).

Ultimately, our activities will enhance smallholder agricultural and forest production, develop

international cooperation and in-country agricultural research and extension services, and reduce the impact of invasive alien scale insects and related excessive pesticide use.

13. Methodology

Describe the methods and approach you will use to achieve your intended Outcome and Impact. Provide information on how you will undertake the work (materials and methods) and how you will manage the work (roles and responsibilities, project management tools etc.).

(Max 500 words – this may be a repeat from Stage 1, but you may update or refine as necessary. Tracked changes are **not** required.)

We will undertake this study in different lowland agro-ecosystems in three coastal counties: Kilifi, Mombasa and Kwale, where the recent outbreak of the newly recorded Papaya mealybug occurred (Box 17a). Past failures to control scale insect introductions quickly were due to poor reporting and pest misidentifications, resulting in misdirected control efforts, and crop and farm income losses and damage to biodiversity. Biological and social science research will be combined to develop Kenyan scale insect identification capacity and resources; communication to key stakeholders; and policy engagement:

1. Delayed reporting due to poor understanding by smallholder farmers/foresters and extension workers of yield loss, pesticide expense and biodiversity threats posed by scale pests:
 - a. Raise stakeholder understanding through dissemination by extension workers of targeted information sheets tailored to needs identified
2. Insufficient capacity among extension workers, parataxonomists and taxonomists to collect, prepare and identify scale insects to standard required for pest management:
 - a. Train 15 taxonomists, 30 parataxonomists and 50 extension workers on scale insect field recognition, collection, preservation, slide-mounting and identification. Training courses managed by NMK and NHM in Nairobi.
 - b. Develop field identification aids, diagnostic tools for sorting samples and keys for species-level identification for taxonomists, produced by NHM experts.
3. Poor knowledge of Kenyan fauna, and of threats presented by alien introductions, hindering identification:
 - a. Generate scale insect inventory and assessment of their impact on crop production;
 - b. Distribute information on alien invasive species threats to entomologists and extension workers.
 - c. Develop reference infrastructure including national scale insect collection, descriptions, images, maps, and online identification aids, facilitating recognition of Kenyan species and early detection of new invasives
 - d. Update Kenyan scale insect quarantine pest list
4. Lack of capacity to manage specific scale insect problems once identified (and its impact on smallholder income):
 - a. Develop, test and disseminate appropriate management tools, with increased emphasis on integrated pest management.
 - b. Engage all stakeholders (decision-makers, scientists, extension officers, smallholder farmers and foresters) and general public through fora including workshops and conferences, and dissemination of informative material.
 - c. Publish policy brief, with National and County Government involvement.

Our Monitoring & Evaluation plan involves:

1. NHM (Ouvrard, Project Leader) and NMK (Kinuthia, local coordinator) ensuring that the project is on schedule and milestones are met
2. Steering Committee, comprising senior members of all partner institutions, a member of extension services, and a representative of the farmer and forester communities, video-conferencing quarterly

3. Periodic and final technical and financial evaluations by NHM senior scientists external to project
4. Data collection:
 - a. Initial and final assessment of knowledge and perception among 250 farmers and foresters regarded as being at high risk, including gender-based roles in pest management in smallholder households.
 - b. Initial and final assessment of pest control methods employed by stakeholders.
 - c. Initial and final assessment of economic and livelihood impact of yield loss due to scale insects.
 - d. Initial and final assessment of identification / management response time
 - e. Initial and final assessment of agrobiodiversity using parasitic wasps as indicator (identifications by NHM expert).

14. 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 and for people in developing countries, and how they are linked. 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.

(Max 500 words)

The project will mitigate the negative impacts of untargeted pesticide application on (1) crop yields and smallholder debt, alleviating poverty; and (2) natural enemy biodiversity and the environment. Applying integrated pest management (IPM) together with targeted chemical use will reduce costs, improve yields and protect the agro-ecosystem. Such IPM packages have shown to be successful to control various pests in sub-Saharan Africa.

(a) Short-term benefits:

(1) At least 250 smallholder-farmer/forester households and >50 extension workers will show novel understanding of scale insect threats and sustainable agricultural practices (lack of knowledge of pests and diseases being a cause of poor pesticide practices).

(2) At least 250 smallholder-farmer/forester households will display better recognition of scale pests and their natural enemies, and improved pest management practices, which will improve crop productivity and increase natural enemy diversity. Recognition of scale pests and damage symptoms will help to target the use of pesticides.

(3) In at least 250 smallholder-farm/forester households, yield losses to pests related to inappropriate pesticide use will decrease. Dedicated cost-effective, reproducible and sustainable management programmes will improve crop quality and yield, and allow recovery of natural enemy populations.

(4) At least 30 scale species recorded from at least 250 farms, with an update of the scale fauna and quarantine lists of Kenya. An inventory of natural enemies will be undertaken concurrently in order to supply further IPM packages and biocontrol actions.

(5) Sustainable agro-ecosystems restored in and around 250 smallholder farms, and endemic trees preserved from devastating scale insects.

(b) Long-term benefits:

(1) Policy changes on pest management in agriculture integrating smallholder farmers' well-being and agro-ecosystem preservation, and provision of dedicated information material to extension workers, NGOs and CBOs, leading to increased smallholder crop/forest productivity and biodiversity over wider areas as improved pest recognition and management practices

spread. Efficient expert support will be supplied by taxonomist researchers when basic knowledge from training is not enough.

(2) Accurate identification of scale pests enabling appropriate targeting of pest management, stopping the expensive untargeted use of pesticides that currently impacts native beneficial entomofauna, soil organisms and ground water quality, with a triple impact:

- Early future detection, identification and accurately targeted responses against invasive scale pests threatening biodiversity on farms and in natural habitats, through effective scientific monitoring and updating of the national pest list (all impossible without the necessary knowledge and awareness); response time to new introductions of invasive scale species lowered from several years to 6 months or less
- In smallholder-farmer/forester communities, appropriate targeting of pest management conserves natural enemies and pollinators so that ecosystem services reduce the need for pesticide use and give rise to improved yields
- In multi-scale farms/forestry, appropriate targeting of pest management improves agro-ecosystem function and hence crop yields, reducing pesticide use and farmers' debt levels

(3) New/enhanced scale insect reference collections at NMK, UoN, KALRO, KEFRI and KEPHIS; scale insect identification aids; and identification skills at NMK and University of Nairobi, will benefit East Africa in the long-term, through international collaborations and consultancy services (see exit strategy).

15. Gender

All applicants must consider whether and how their project will contribute to reducing inequality between persons of different gender. Explain how your project will collect gender disaggregated data and what impact your project will have in promoting gender equality.

(Max 300 words)

In Kenya, women play a predominant role in producing and providing food for the family, whereas off-farm activities are mainly undertaken by men. The gender component in access to production resources, farm decision making and roles, and access to inputs, is crucial and will be carefully considered in this project.

Johnson *et al.* (2017) have shown that women smallholders need better access to agricultural extension. Similarly, women and men have varied sources of information some of which are prerogative of men, e.g. radio. So use of a diversity of communication channels will also ensure that more women will have access to information, through media articles, radio programs, fact sheets, pamphlets and brochures. In this respect, this project will ensure that the transmission of information about scale insect pests and their management (through extension services) will consider women and men's needs and most appropriate communication medium.

The initial socio-economic survey will first establish farming capacities and responsibilities based on gender, so that the contact farmers are selected on the basis of their involvement in crop and food production; this will give opportunities to more women to have access to agricultural extension information and to increase their influence in decision-making.

The project will endeavour to gather gender disaggregated data, to better understand men and women's participation in project activities, especially regarding perceptions, knowledge and change in practices. The team will also aim to understand impediments to women and men's full access to agricultural inputs and good practice advice.

The project will enhance gender parity in smallholder-farmer/forester households by providing supportive measures to the farmer - man or woman - in charge of growing crops and trees for firewood/timber and making decisions on the daily management of the farm, mainly through the dissemination of information.

16. Exit strategy

State whether or not the project will reach a stable and sustainable end point. If the project is not discrete, but is part of a progressive approach, give details of the exit strategy and show how relevant activities will be continued to secure the benefits from the project. Where individuals receive advanced training, for example, what will happen should that individual leave?

(Max 200 words)

Project objectives include increasing crop yields in targeted households by the end of the project. The capacity building component of the project will establish sustainably: trained university teaching staff and stakeholders throughout the chain of decision, and durable reference facilities (collections and databases, online and printed identification manuals). Key national institutions in charge of agriculture and biodiversity will have at least 15 individuals trained during the project, enabling the whole mechanism of pest management (including detection of novel invasive species) to be sustained through subsequent horizontal and vertical knowledge transfers among and between institutions belonging to the Scale Pest Partnership (with the option of more institutions/entities participating in the future).

The project will position Kenya as the key resource country for East African scale insect identification and management, creating opportunities for developing international cooperation and gaining regional independence in such expertise. With sustainable expertise in place, long-term benefits of the project like improved livelihoods and biodiversity conservation can be extended beyond the three coastal counties in this study. The pest management change, from untargeted pesticide use to sustainable practices, will continue to provide benefits of poverty alleviation and food security, with less resistance of pests and fewer environmental impacts.

17a. Harmonisation

Is this a new initiative or a development of existing work (funded through any source)? Please give details

(Max 200 words)

This project is a new initiative, building on the outcomes of a Scoping award (DARSC175, 2017). The work was initiated by reports from NMK of a recent escalation in scale insect damage on crops hitherto unaffected in Kenya and requests from local stakeholders for better information on scale insect species present in the country and how to identify them.

The need for technology and knowledge transfer was demonstrated during the visit by the scoping travellers to partners in Nairobi, when a recently introduced pest was authoritatively identified as the papaya mealybug, *Paracoccus marginatus*, by U.K. world-class expert Dr Gillian Watson. Since its detection in 2016, Kenyan papaya farmers have already experienced a mean yield loss of 91% (Macharia *et al.*, 2017).

The aims of this project are to develop local expertise; put sustainable management programs in place in three coastal counties; increase crop yields in targeted households by the end of the project; and create opportunities for further transfer of expertise to occur nationally (through policy briefs) and internationally.

17b. Are you aware of any other individuals/organisations/projects carrying out or applying for funding for similar work? **No**

If yes, please give details explaining similarities and differences. Explain how your work will be additional to this work and what attempts have been/will be made to co-operate with and learn lessons from such work for mutual benefits.

N/A

18. Ethics

Outline your approach to meeting the Darwin Initiative's key principles for research ethics as outlined in the [Guidance](#).

(Max 300 words)

Ethics are an essential part of decision-making and practice in the Natural History Museum. The Museum's policy and principles stipulate that it adheres to ethical standards appropriate to public, professional and other functions. It operates within legal standards in the UK and in other countries in which it operates. Those collaborating with the Museum or in formal association are expected to follow comparable standards.

We will act with integrity, not placing ourselves under any financial or other obligation to outside individuals or organisations that might seek to influence us in the performance of our duties. We will avoid any act which compromises, or which could be seen to compromise our independence and integrity or that of the Museum; and we will take appropriate steps to identify and deal with malpractice and professional misconduct.

We will be honest in all aspects of science, including in the presentation of research goals, intentions and findings; in reporting on research methods and procedures; in gathering and managing data and collected objects and in making them available; in using and acknowledging the work of other scientists; and in conveying valid interpretations and making justifiable claims based on research findings.

We will pursue transparency and open communication in declaring conflicts of interest; in the reporting of research data collection methods; in the analysis and interpretation of data; in making research findings widely available, which includes sharing negative results as appropriate; and in presenting the work to other researchers and to the general public through publications, databases, collections and public engagement.

The project steering committee will include senior management members of national institutions who will ensure collectively that all principles of ethics will be respected, in terms of legal obligations, benefit sharing and participation of local stakeholders, privacy, voluntary involvement and absence of discrimination.

19. Raising awareness of the potential worth of biodiversity

If your project contains an element of communications, knowledge sharing and/or dissemination please provide a description of your intended audience, how you intend to engage them, what the expected products/materials will be and what you expect to achieve as a result. For example, are you expecting to directly influence policy in your host country or is your project a community advocacy project to support better management of biodiversity?

(Max 300 words)

The communication component of the project is ambitious and multi-scale. The variety of partners will ensure that the largest audience will be reached using a number of communication channels. Technical briefs will ensure that each institution will communicate on different but complementary aspects of the project. CABI will be leading the communication strategy, as follows:

- the general public will be informed via media articles (e.g. the dedicated *Seeds of Gold* pages in the weekly Saturday Nation) and radio programs. This will cover general information on scale insect threats to crops and trees, and the importance of healthy agro-ecosystems in pest management and food security.
- farmers will be engaged through multi-media campaigns employing printed leaflets and posters, mobile-mediated messages and/or social media. Farmer-friendly messages on best practice for specific crops will be disseminated in this way.

- various stakeholders (including extension workers) will be informed by dedicated webpages and knowledge platforms online, as well as fact and photo sheets. More specific information on major and recently introduced pests will be given on these easy-to-update platforms.
- in our communication strategy, particular attention will be paid to reaching women in order to address their particular need for training and advice. Using appropriate media targeted at women will increase their involvement in the necessary changes to be adopted at farm level.

Another component of our communication strategy involves dissemination of project activities and deliveries to politicians and experts through one policy brief describing sustainable measures to be taken against pests. A policy dialogue will take place between all participants of the project, and direct implications for smallholder farmers and foresters will be captured from the project and disseminated to national and local government entities regularly and as a final document.

20. Capacity building

If your project will support capacity building at institutional or individual levels, please provide details of what form this will take and how this capacity will be secured for the future.

(Max 300 words)

The project has a strong capacity building component, at several levels of the pest management decision chain.

Taxonomic researchers: fifteen individuals (researchers and technicians) employed by NMK, UoN, KALRO, KEFRI and KEPHIS will be trained in scale insect identification to species by Dr Gillian Watson, whose experience in transmitting knowledge on scale insect taxonomy is extensive. At least one Master's position will be open for a local student at UoN. All institutions have expressed their need for on-site expertise. The reference collection of scale insects that the project will set up in each of these institutions will help to secure the level of expertise gained, as well as to develop more collaborations in the future with other national and international institutions. The partner institutions will be able to develop further research on relevant aspects of scale insects, using the ecological and biological data the project will produce.

Parataxonomists and extension officers: capacity building at the field service extension level is crucial and will be carefully delivered at the laboratory by experts from NHM, NMK and UoN, with the help of KEFRI, KALRO and KEPHIS for the implementation in farms; fifty extension officers will be trained, developing local long-term capacity. Thirty parataxonomists will also be trained in basic scale insect biology, field collection, sorting, preservation and identification, in order to support the work of extension officers with farmers and to ensure effective dialogue between the field and the laboratory. CABI will provide dedicated training and information materials which extension officers will use beyond the project to spread environment-friendly practices and methods to develop pest-resilient agroecosystems among farmer communities.

At least 250 households will be trained to environment friendly pest management; this capacity at individual level will be secured through local community meetings and workshops, and recurrent training by extension services.

21. Access to project information

Please describe the project's open access plan and detail any specific funds you are seeking from Darwin to fund this.

(Max 250 words)

We will make sure that all the information resulting from the project will be publicly available, free of charge, in order to achieve the greatest public impact. All technical reports will become openly available on a dedicated website. All diagnostic tools and identification material will also be freely available online, on dedicated pages of the CABI platforms. The national collection of Kenyan scale insects will be digitised, and both images and associated data will be made available through NHM and NMK data portals. KEPHIS will update and make publicly available the list of Kenyan scale insect pests for plant quarantine purposes.

In order to avoid costs of publishing open access articles, submitted versions of all peer-reviewed publications will be deposited into the NHM repository, which is openly available via the web, and is indexed in OpenDOAR, an authoritative directory of academic open access repositories worldwide. In addition OpenDOAR is registered with CORE, a JISC funded service which aggregates open access research outputs from repositories and journals.

The only funds dedicated to disseminating the project information will be requested to print posters, factsheets, and photo sheets, in order to reach the fraction of the population with no access to the internet.

Our communication strategy also includes communication through mass media (radio, newspaper), social media, and institution newsletters, all free of charge.

Project Monitoring and Evaluation

Measuring Impact

22. Logical Framework

Darwin projects will be required to report against their progress towards their expected Outputs and Outcome if funded. This section sets out the expected Outputs and Outcome of your project, how you expect to measure progress against these and how we can verify this.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: Improve awareness, response time and implementation of appropriate management strategies against threats to agro-biodiversity by invasive species (Max 30 words)			
Outcome: (Max 30 words) Kenyan livelihoods enhanced in >250 smallholdings; local agrobiodiversity improved by enhanced capacity to identify and manage scale insects at institutional, extension service and community levels, in smallholdings and native ecosystems.	0.1 By the end of the project, at least 250 smallholder households have a better knowledge of scale insects and their impact, and they all show novel understanding and skills in recognition of scale insects as pests in their crops 0.2 By the end of the project, at least 50 extension workers have a better knowledge of scale insects and their impact, and they all show novel understanding and skills in identification of pests and diseases, and management of emerging scale insect pest using environmentally safe and sustainable management practices 0.3 By end of the project, relevant research and advisory infrastructure improved in the form of 1 national comprehensive reference collection, 4 smaller working institutional collections, and associated database, at least 15 taxonomic experts, 30 parataxonomists and 50 extension workers delivering an accurate identification/advisory service with a response time of <6 months	0.1 Signed lists of surveyed individuals; capacity assessment technical report based on pre- and post-project surveys; scientific publication on the socio-economic impact of smallholders perception of scale insect threats and awareness of appropriate pest management strategies 0.2 Signed lists of surveyed individuals and training records; capacity assessment technical report based on pre- and post-project surveys 0.3 Technical reports on the reference insect collections and associated online data portal; relevant identification keys published by Kenyan new taxonomic researchers (M.I. 3.3); a novel, photo-illustrated field identification aid developed for and disseminated to each major stakeholder categories (smallholder farmers / foresters,	Kenya remains politically stable. Farmers and foresters want to make use of the knowledge provided by the extension services. Extension staff is motivated in transmitting new knowledge and pest management protocols to farmers and foresters. Crop yield is not negatively impacted by factors outside the scope of the project such as adverse weather conditions. Agrobiodiversity is not negatively impacted by factors outside the scope of the project such as adverse weather conditions or changed land use. Government ministries adopt the resulting policy brief

	<p>0.4 By end of the project, at least 250 smallholder households display better scale insect management practices and record decreased yield losses to scale insects</p> <p>0.5 By end of the project, local agrobiodiversity shows significant increase in at least 250 smallholder households</p> <p>0.6 By end of the project, information disseminated to decision-makers through a policy brief and to a wider audience through mass media articles</p>	<p>extension officers, para-taxonomists); online information and research database; reports on time response to all new scale insect outbreaks</p> <p>0.4 Reports from baseline and end of project participatory farmers and foresters communities assessment surveys for yield and income</p> <p>0.5 Reports from baseline and end of project diversity and abundance surveys of natural control agents in participatory farmers and foresters households</p> <p>0.6 Policy brief on sustainable management of scale insects submitted to governmental policy-makers and published online</p>	
<p>Outputs:</p> <p>1. Increased informed perception by smallholder farmers/foresters and extension providers of the scale insect threats to agricultural production, and on the means to manage the pests without disturbing agro-ecosystems, leading to increased crop yield for affected farms.</p>	<p>1.1 At least 250 smallholder farmers and foresters recognise scale insect attack and pest impact in all cases by end of project, with data disaggregated by gender</p> <p>1.2 Increased income through higher yield and less pesticide expense in at least 250 smallholder farmers and foresters where scale insects outbreaks occurred by the end of the project</p> <p>1.3 By the end of the project, sustainable agro-ecosystems restored, with biodiversity benefits, in and around 250 smallholdings where massive untargeted pesticide application occurred</p>	<p>1.1 Report on capacity assessment, including respective roles of men and women in rural households, and information/awareness constraints</p> <p>1.2 Report on baseline yield and end of the project yield, in link with pesticide use</p> <p>1.3 Reports on natural enemies diversity and abundance (early stage and towards the end)</p>	<p>Smallholder farmers, foresters and extension workers are willing to participate in the survey.</p> <p>Smallholder farmers, foresters and extension workers are willing to learn new information and change existing practices.</p> <p>Crop yield is not negatively impacted by factors outside the scope of the project such as adverse weather conditions.</p> <p>Agrobiodiversity is not negatively impacted by factors outside the scope of the project such as adverse weather conditions or changed land use.</p> <p>Extension workers remain active and motivated during the entire duration of</p>

			the project to ensure both the before and after surveys are successful.
<p>2. A publicly-available scale insect and natural enemies inventory for Kenya developed, with distributions maps for species recorded from the study area in three coastal counties of Kenya.</p>	<p>2.1 One student and 4 technicians from UoN and KEPHIS trained in field recognition, collection, preservation, slide-mounting, digital photography and identification</p> <p>2.2 At least 30 scale insect species recorded in target areas, with associated natural enemies</p> <p>2.3 At least 250 farms in the three coastal counties visited. All species discovered entered in the National reference collection</p> <p>2.4 At least 600 data records entered into a relational database (species identity, locality, date collected, host, natural enemies, images)</p> <p>2.5 At least 30 distribution maps produced</p> <p>2.6 Kenyan pest list reviewed to include scale insect species not recorded previously</p>	<p>2.1 Report on capacity assessment in collecting and taxonomy</p> <p>2.2 Published checklist of scale insects of Kenya, and their natural enemies</p> <p>2.3 Technical report on the survey results; technical report on the national scale insect reference collection</p> <p>2.4 Technical report on the database, with specimens and associated data; database object statistics; publicly available database</p> <p>2.5 Maps showing distribution of scale insect species including pests, associated plants and natural enemies; predictive models of insect pest movement</p> <p>2.6 List of Kenyan scale insect pests for plant quarantine purposes updated by KEPHIS based on field surveys</p>	<p>Climatic conditions are conducive to sampling.</p> <p>Freedom from drought for the duration of the project.</p> <p>Smallholder farmers accept their field to be surveyed.</p> <p>Collecting, research and sample sharing permits are obtained in a timely manner from the government bodies in charge.</p> <p>Students interested in scale insects are available for recruitment.</p>
<p>3. Taxonomic researchers, parataxonomists and extension officers trained, and pest management decision chain implemented through identification capacity building among all stakeholders</p>	<p>3.1 Fifteen taxonomists, 30 parataxonomists and 50 extension officers trained in scale insect collection and handling, preservation, slide mounting and identification (disaggregated by type of training and profession) by end of year 1</p>	<p>3.1 Participant certificates and assessment records</p>	<p>Equipment (especially microscopes) in good working order is sufficient for training up to 20 to 25 trainees.</p>

	<p>3.2 NMK national collection of scale insects enhanced, and 4 institutional reference collections established at UoN, KALRO, KEFRI and KEPHIS</p> <p>3.3 One identification key to scale families, 12 keys to genera and 90 keys to species developed and published for taxonomists by end of year 2</p> <p>3.4 One photo guide for smallholder farmers, 1 photo guide for smallholder foresters, 1 photo guide for parataxonomists, 1 photo guide and at least 30 fact sheets for extension officers developed by end of year 2</p>	<p>3.2 Technical reports on number of specimens, coverage, curation methods, identification accuracy and completeness</p> <p>3.3 Identification keys and publications</p> <p>3.4 Identification aids, diagnostic tools and information sheets; dissemination records</p>	
<p>4. Best practices for improving management of scale insect pests developed, disseminated to raise key stakeholder awareness and capacity, and adopted by them</p>	<p>4.1 Best practices intended to guide sustainable scale insect pest management practice developed by mid-year 2</p> <p>4.2 Policy brief produced by the end of the project</p> <p>4.3 Five media articles and radio programs every year of the project, for general public information</p> <p>4.4 Three hundred stakeholders (smallholder farmers, smallholder foresters, extension officers and plant quarantine inspectors) engaged through various fora and use of information materials (disaggregated by category) by end of the project</p>	<p>4.1 Best practices document</p> <p>4.2 Participant certificates and policy brief published</p> <p>4.3 Report on communication (title, content, audience)</p> <p>4.4 Publications, technical briefs, media articles, radio programmes, fact sheets, photo sheets, pamphlets, brochures; project progress and final reports; feedback from stakeholders in the final report</p>	<p>County and national stakeholders are willing to collaborate.</p> <p>Political climate remains suitable for holding county workshops.</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)

- 1.1 KALRO and KEFRI document perception and knowledge in smallholder farmers and foresters respectively, using socio-economic questionnaires (developed in collaboration with CABI) at local community meetings, during the early stage and towards the end of the project. Respective roles of men and women in rural households are captured through the surveys
- 1.2 KALRO and KEFRI document yield increase and pesticide use in smallholder farmers and foresters respectively, at local community meetings, through assessments during the early stage and towards the end of the project
- 1.3 NHM, UoN and NMK survey natural enemies at 250 smallholdings all along the project
- 2.1 NHM trains students and technicians from UoN and KEPHIS to field recognition, collection, preservation, slide-mounting, digital photography and identification
- 2.2 UoN and KEPHIS coordinate the survey of scale insects and natural enemies (collecting, sorting, on-site preservation, slide-mounting, digitisation) on a variety of crops and indigenous trees in three counties of the coastal area
- 2.3 NMK and UoN identify specimens with the scientific support of NHM, and enter them in the National reference collection, with corresponding slide images and associated data. Duplicates are deposited in other institutions' smaller working collections and at the NHM
- 2.4 NHM and NMK set up the database for the scale insect fauna of Kenya and enter data on specimens, taxonomy, host-plants, natural enemies, associated diseases, environmental and socio-economic impact
- 2.5 NMK produces distribution maps of scale insects including vegetation and crop production, with historical and recent outbreaks highlighted
- 2.6 KEPHIS reviews Kenyan pest list to include scale insects not yet recorded
- 3.1 NHM trains taxonomic researchers (including technicians in participating institutions for continuity) on slide making and identification, digitisation, collection enhancement and curation
- 3.2 NHM and UoN train parataxonomists and extension officers on basic scale biology, field collection, sorting, preservation and basic identification, on natural enemies recognition and on sustainable agricultural practices
- 3.3 NHM, NMK and UoN develop and publish identification keys to families, genera and species for scale insect pests of Kenya, including putative future invasive species
- 3.4 CABI produces field identification aids, fact sheets and photo sheets which will be used by extension workers and NGOs to train farmers
- 4.1 KEPHIS produces a best practices document for sustainable scale insect pest management
- 4.2 KEPHIS produces a policy brief based on social and insect surveys, results and analyses, regarding best practices in managing scale insect pests and benefit of natural enemies to biodiversity and agriculture. Meet policy brief stakeholders and agree on final texts to be published
- 4.3 Mass media campaigns and programmes are prepared
- 4.4 All categories of stakeholders engaged through fit-for-purpose information materials and updated information websites, and working/quarantine lists

23. Provide a project implementation timetable that shows the key milestones in project activities. Complete the following table as appropriate to describe the intended workplan for your project (starting from Q2 July 2018)

Please add/remove columns to reflect the length of your project. For each activity (add/remove rows as appropriate) indicate the number of months it will last, and shade only the quarters in which an activity will be carried out. The workplan can span multiple pages if necessary.

Activity	No. of months	Year 1			Year 2				Year 3			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output 1 Generation of information on perception by smallholder farmers/foresters and extension providers of the scale insect threats to agricultural production, and on the means to manage the pests without disturbing agro-ecosystems												
1.1 KALRO and KEFRI document perception and knowledge in smallholder farmers and foresters respectively, using socio-economic questionnaires (developed in collaboration with CABI) at local community meetings, during the early stage and towards the end of the project. Respective roles of men and women in rural households are captured through the surveys	2											
1.2 KALRO and KEFRI document yield increase and pesticide use in smallholder farmers and foresters respectively, at local community meetings, through assessments during the early stage and towards the end of the project	2											
1.3 NHM, UoN and NMK survey natural enemies at 250 smallholdings all along the project	12											
Output 2 Generation of a scale insect and natural enemies inventory, and distribution mapping of those species in three coastal counties of Kenya												
2.1 NHM trains students and technicians from UoN and KEPHIS to field recognition, collection, preservation, slide-mounting, digital photography and identification	1											
2.2 UoN and KEPHIS coordinate the survey of scale insects and natural enemies (collecting, sorting, on-site preservation, slide-mounting, digitisation) on a variety of crops and indigenous trees in three counties of the coastal area	12											
2.3 NMK and UoN identify specimens with the scientific support of NHM, and enter them in the National reference collection, with corresponding slide images and associated data. Duplicates are deposited in other institutions' smaller working collections and at the NHM	24											
2.4 NHM and NMK set up the database for the scale insect fauna of Kenya	2											

24. Project based monitoring and evaluation (M&E)

Describe, referring to the Indicators above, how the progress of the project will be monitored and evaluated, making reference to who is responsible for the project's M&E. Darwin Initiative projects are expected to be adaptive and you should detail how the monitoring and evaluation will feed into the delivery of the project including its management. M&E is expected to be built into the project and not an 'add' on. It is as important to measure for negative impacts as it is for positive impact.

(Max 500 words)

The NHM project leader and NMK local coordinator will lead the overall Monitoring and Evaluation process, ensuring that project activities are on track and outputs are delivered on time. The dedicated Steering Committee will follow this M&E plan to make sure that milestones and deliverables are met, assessing progress against output indicators from the LogFrame. At the quarterly meetings of the Steering Committee partners will communicate on progress, deliver data, results and analyses, allowing the Committee to make any adjustments which may be needed to successfully deliver the outcome. Additionally, independent NHM senior scientists and administrative staff external to the project will review its technical and financial aspects, applying the cutting-edge evaluation standards they use for other major international collaborative initiatives.

Impacts of the project on capacity building, smallholder farmers' and foresters' livelihoods and local agro-biodiversity will be assessed intermittently through several initial and final assessment field surveys and intermittent meetings with the smallholder communities to discuss progress.

KALRO and KEFRI will gather data on pest knowledge, agricultural methods, pest impact on crops and trees, and pesticide use by smallholder farmers and foresters, at workshops and meetings, using questionnaires developed in collaboration with CABI. Baseline data obtained at the start of the project will be compared to Year 3 data, capturing project impacts resulting from the adoption of sustainable agricultural methods like integrated pest management, on (1) smallholder yields and income, and (2) local biodiversity, enabling natural control agents to provide the necessary agro-ecosystem services.

KALRO, KEFRI and CABI will monitor thoroughly the implementation of new sustainable agricultural practices in small households through regular meetings with local communities and extension services.

Continuous assessment of natural control agents present on targeted farms, based on specimens collected by UoN and NMK, will be undertaken by NHM experts. The observed diversity and abundance of natural enemies in and around the farm plots, related to continuous monitoring of pesticide use, will document the impact of the project on agrobiodiversity.

NHM and NMK will train students, technicians, extension officers, parataxonomists and taxonomists in scale insect sampling, identification and management, with data on participants and participant capacity assessment gathered at all training sessions. The impact of capacity building in scale insect taxonomy on the response time by all stakeholders to new outbreaks will be monitored for speed and efficacy, based on frequent scale insect samples collected by UoN and KEPHIS, various identification tools/aids developed by CABI and the reference collections established in partner agricultural institutions.

All gathered data will be analysed and used to write the necessary technical reports. These reports, in addition to periodic reports by all partners, will be used to monitor and evaluate continuously the technical value of the project, its impact on livelihoods and the influence it is having on restoring agro-biodiversity where it has been damaged.

Number of days planned for M&E	91
Total project budget for M&E	£16,502

Percentage of total project budget set aside for M&E	4.5%
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Funding and Budget

Please complete the separate Excel spreadsheet which provides the Budget for this application. Some of the questions earlier and below refer to the information in this spreadsheet. You should also ensure you have read the '[Finance for Darwin and Illegal Wildlife Trade Challenge Fund](#)' document and considered the implications of payment points for cashflow purposes.

NB: The Darwin Initiative cannot agree any increase in grants once awarded.

25. Value for Money

Please explain how you worked out your budget and how you will provide value for money through managing a cost effective and efficient project. You should also discuss any significant assumptions you have made when working out your budget.

(max 300 words)

The project will deliver a better extension system, providing faster, more accurate identifications - a model for the rest of the country once its efficacy has been demonstrated. It will enable reduction of pesticide use, also transferrable across the country, facilitated by policy engagement through the policy brief. Creation of a resource of taxonomic expertise and reference collections will directly benefit the entire country, immediately having a sustainable impact, removing an impediment to reducing crop losses across Kenya and beyond.

The choice of government institutions for 5 out of 6 local partners maximises value for money; they have regional offices in the chosen study area, and a network of collaborators among smallholder communities, minimising travel costs, and can devote the necessary time to activities. Project aims and outcomes match our partners' mandates, reducing costs for external consultants and giving more project management flexibility and responsiveness.

CABI will use the most cost-effective way of disseminating information to each stakeholder category, with delivery of information to farmers and foresters being the priority. Printed materials will be kept to a minimum, with dissemination through CABI's various digital platforms being the first choice.

Capacity building in scale insect taxonomy in Kenya will be made cost-effectively through knowledge transfer from U.K. experts. Once established, well-curated scale reference collections at major agricultural institutions will be reliable and very cost-effective tools for diagnosing emerging pests.

Capital equipment like vehicles are unnecessary in this project, all fieldwork costs being directly dedicated to data gathering, both for baseline values and evaluating progress.

In project Monitoring and Evaluation, value for money will be maximised by the integrated involvement of senior scientists of partner institutions. External evaluators will ensure the project meets the benchmarks of other international initiatives, whereas internal evaluators will help in minimising the costs of delivering all objectives.

26. Capital items

If you plan to purchase capital items with Darwin funding, please indicate what you anticipate will happen to the items following project end.

(max 150 words)

No capital equipment was necessary for achieving the project objectives.

27. Match funding (co-finance)**a) Secured**

Provide details of all funding successfully levered (and identified in the Budget) towards the costs of the project, including any income from other public bodies, private sponsorship, donations, trusts, fees or trading activity.

Confirmed:

NHM:

£XX,XXX matched

salaries £XX,XXX indirect costs

NMK:

£X,XXX matched salaries

£X,XXX office and lab

space

KALRO:

£XX,XXX matched salaries

£X,XXX office space, vehicles, internet services

KEFRI:

£XX,XXX matched salaries

£X,XXX office space, laboratory facilities, vehicle

KEPHIS:

£X,XXX matched

salaries

University of Nairobi:

£XX,XXX matched

salaries

CABI:

£X,XXX matched

salaries

Total match funding: £XXX,XXX

27b) Unsecured

Provide details of any matched funding where an application has been submitted, or that you intend applying for during the course of the project. This could include matched funding from the private sector, charitable organisations or other public sector schemes.

Date applied for	Donor organisation	Amount	Comments

27c) None

If you are not intending to seek matched funding for this project, please explain why.

(max 100 words)

N/A

28) Financial Management Risks

Explain how you have considered the risks and threats that may be relevant to the success of this project, including the risks of fraud or bribery.

(max 200 words)

One risk is a lack of compliance of Kenyan institutions with established financial regulations, due to weak control and low capacity environment. However, all Kenyan partners are national or international institutions which show high-standard financial management, accounting and audit systems. Financial controls have proved to be reliable in a number of national and international projects these institutions have been involved in.

Funds will be managed by NHM, a UK executive non-departmental public body, sponsored by the Department for Digital, Culture, Media & Sport, with strong financial regulations, promoting value for money and preventing fraud, waste and irregularities. NHM will set up financial controls, evidenced by invoices and receipts, and will link payments in arrears to the Kenya partners to the actual delivery of specific outputs which will have defined timelines for completion.

Kenya's political stability is crucial for project implementation, any destabilization making the Kenyan financial system more fragile.

FCO Notifications

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

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) and attach details of any advice you have received from them.

Yes (no written advice) **Yes, advice attached** **No**

Certification

On behalf of the trustees of
The Natural History Museum

I apply for a grant of £ £236,658 in respect of **all expenditure** to be incurred during the lifetime of this project based on the activities and dates specified in the above application.

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 enclose CVs for key project personnel and letters of support.
- I enclose our last two sets of signed audited/independently verified accounts and annual reports

Name (block capitals)	Prof. Ian Owens
Position in the organisation	Director of Science

Signed**

Date:

29/01/18

If this section is incomplete or not completed correctly the entire application will be rejected. You must provide a real (not typed) signature. You may include a pdf of the signature page for security reasons if you wish. Please write PDF in the signature section above if you do so.

Stage 2 Application – Checklist for submission

	Check
Have you read the Guidance ?	
Have you read and can you meet the current Terms and Conditions for this fund?	
Have you provided actual start and end dates for your project?	
Have you provided your budget based on UK government financial years i.e. 1 April – 31 March and in GBP?	
Have you checked that your budget is complete , correctly adds up and that you have included the correct final total on the top page of the application?	
Has your application been signed by a suitably authorised individual? (clear electronic or scanned signatures are acceptable)	
Have you included a 1 page CV for all the key project personnel identified at Question 6 and Question 10?	
Have you included a letter of support from your <u>key</u> partner organisations identified at Question 9?	
Have you been in contact with the FCO in the project country/ies and have you included any evidence of this?	
Have you included a signed copy of the last 2 years annual report and accounts for the lead organisation?	
Have you checked the Darwin website immediately prior to submission to ensure there are no late updates?	

Once you have answered the questions above, please submit the application, not later than 2359 GMT on Monday 29 January 2018 to Darwin-Applications@ltsi.co.uk using the application number (from your Stage 1 feedback letter) and the first few words of the project title **as the subject of your email**. If you are e-mailing supporting documentation separately please include in the subject line an indication of the number of e-mails you are sending (eg whether the e-mail is 1 of 2, 2 of 3 etc). You are not required to send a hard copy.

Data Protection Act 1998 - Fair Processing Notice

The purpose of this Fair Processing Notice is to inform you of the use that will be made of your personal data, as required by the Data Protection Act 1998.

The Department for Environment, Food and Rural Affairs (Defra) is the data controller in respect of any personal data that you provide when you complete your application, the grant acceptance and the supplier forms.

Defra will use your personal data primarily for the purpose of processing your application for Darwin Initiative funding. By submitting an application, applicants have agreed to any disclosure of the information supplied (including the content of a declaration or undertaking) which Defra considers necessary for the administration, evaluation, monitoring and publicising of the Funds (as detailed in the paragraphs below).

A completed application form signifies agreement to place certain details of successful applications (i.e. name, title, total grant value, project summary, lead organisation and location of project work) on the Darwin Initiative websites listed below. A completed application form also signifies agreement to send data on the project proposals during the application process to British Embassies and High Commissions outside the UK, including those outside the European Economic Area.

<http://www.darwininitiative.org.uk>;

<https://www.gov.uk/government/groups/the-darwin-initiative>;

Application form data will also be processed by Defra contractors dealing with Darwin Initiative administration, monitoring and evaluation (working within relevant data protection rules).

Defra may be required to release information, including personal data and commercial information, on request under the Environmental Information Regulations 2004 or 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 Data Protection Act 1998. The Grantee shall assist and co-operate with the Department (at the Grantee's expense) to enable the Department to comply with its disclosure obligations under these enactments.

We may use information, including personal data, to test computer systems to ensure that they work effectively and efficiently and to develop new systems in order to improve efficiency and the service that we provide to you and other persons. Any use of information for testing or developing computerised systems will be conducted in a secure manner in accordance with the Data Protection Act 1998 to safeguard the privacy of the information that you have supplied.

Defra's Personal Information Charter, which gives details of your rights in respect of the handling of your personal data, is on the Defra section of Gov.uk. If you don't have access to the internet, please telephone the Defra helpline 08459 33 55 77 and ask to speak to the Data Protection Officer for a copy of the Information Charter.