

Darwin Initiative Main and Post Project Annual Report

To be completed with reference to the “Writing a Darwin Report” guidance: (<http://www.darwininitiative.org.uk/resources-for-projects/reporting-forms>). It is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)

Submission Deadline: 30th April 2019

Darwin Project Information

Project reference	25-032
Project title	Biodiversity and Agriculture: addressing scale insect threats in Kenya
Host country/ies	Kenya
Lead organisation	Natural History Museum
Partner institution(s)	National Museums of Kenya (NMK); University of Nairobi (UoN); Kenya Agricultural and Livestock Research Organisation (KALRO); Kenya Forestry Research Institute (KEFRI); Kenya Plant Health Inspectorate Service (KEPHIS); CABI
Darwin grant value	£236,658
Start/end dates of project	1 July 2018 – 31 March 2021
Reporting period (e.g., Apr 2018 – Mar 2019) and number (e.g., Annual Report 1, 2, 3)	July 2018 – March 2019 (Annual Report 1)
Project Leader name	David Ouvrard
Project website/blog/Twitter	https://www.cabi.org/projects/project/67610
Report author(s) and date	David Ouvrard – 1 July 2019

1. Project rationale

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 (Conference of the parties to the Convention on Biological Diversity; Fifth meeting; Nairobi, 15-26 May 2000; Agenda item 18.3).

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.

The accurate identification of scale pests will enable appropriate targeting of pest management, and stop the expensive untargeted use of pesticides that currently impacts native beneficial entomofauna, soil organisms and ground water quality.

This study targets different lowland agro-ecosystems mainly in three coastal counties: Kilifi, Mombasa and Kwale, where the recent outbreak of the newly recorded Papaya mealybug occurred (Fig. 1). The main objectives there are:

- To allow 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); to lower response time to new introductions of invasive scale species from several years to 6 months or less.
- In smallholder-farmer/forester communities, appropriately target pest management to conserve 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, appropriately target pest management to improve agro-ecosystem function and hence crop yields, reducing pesticide use and farmers' debt levels.

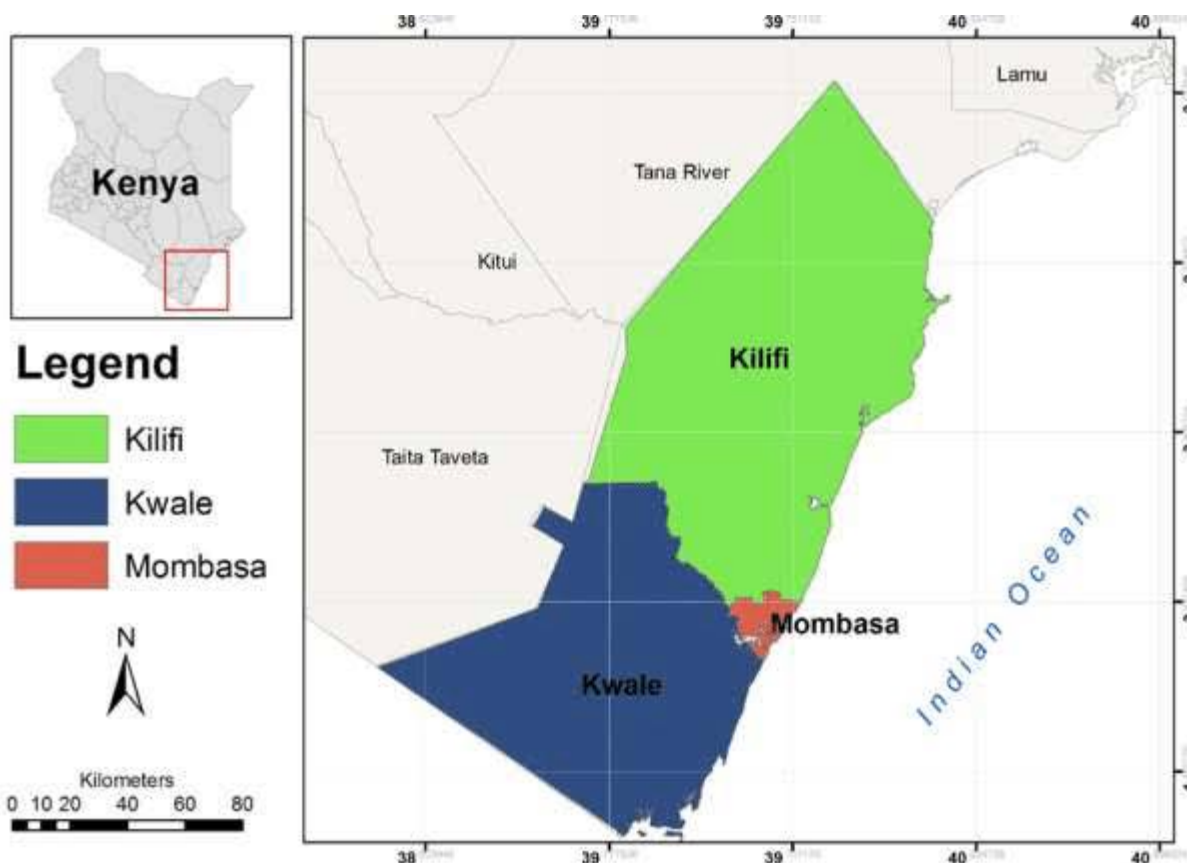


Fig 1: Map of the study site

Macharia I., Kimani E., Koome F., Kosiom T., Heya H., Otipa M. & Oronje M. 2017. First Report and Distribution of the Papaya Mealybug, *Paracoccus marginatus*, in Kenya. *Journal of Agricultural and Urban Entomology* 33: 142-150. <https://doi.org/10.3954/JAUE17-02.1>

2. Project partnerships

The partnership with one university, four government and one not-for-profit organisations was initiated through a former Darwin Initiative scoping award in June 2017, and an initial common engagement in developing the current Darwin main project. All six Kenyan partners have since then engaged immediately after the start of the project, with an important training session led by NHM and NMK involving all institutions and occurring in Nairobi only 11 days after the official start date. However, sub-grant agreement contracts took much longer than expected to be signed by five partners afterwards, despite an early start of the negotiation process. The two major issues were:

1. The request for advance payment by four of the six Kenyan partners. These government institutions couldn't initiate their activities without start-up funds, which required NHM to adapt the standard museum practice or mirroring terms offered by the funder.
2. The draft Intellectual Property Rights clause was rejected by our partners who, in turn, took several weeks to propose a revised version that was acceptable to the parties.

Sub-grant agreement contracts have been signed with all six Kenyan partners, and payments have been made, at the following dates:

Institution	Signature	Payment
NMK	15 March 2019	23 May 2019
University of Nairobi	1 March 2019	2 April 2019
KALRO	28 March 2019	2 April 2019
KEFRI	8 March 2019	2 April 2019
KEPHIS	28 February 2019	23 May 2019
CABI	5 March 2019	2 April 2019

These late involvements of our partners led us to postpone several activities, and take a head start on several other ones.

3. Project progress

3.1 Progress in carrying out project Activities

Output 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.

Activity 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. A questionnaire has been developed by KALRO and KEFRI with the technical support of CABI and inputs from NHM and NMK. It will be administered in 250 small-scale farms in three coastal counties where both crops and trees are grown, in order to capture knowledge and perception of farmers about

scale insects and the role of natural enemies. The current agricultural practices by smallholder farmers will be analysed: this includes listing crops grown, land surfaces used, pesticides used if any, etc. This includes also capturing farming capacities and responsibilities based on gender (to make sure that more women will have access to farming extension information by the end of the project). To make sure that this survey will help in locating the farms or areas where the insect survey will occur all along the project, one member of NMK and one Master student from the UoN will join the socio-economic team to start preliminary field exploration, and make photos which will be used in developing various identification aids (Activities 3.4 and 4.4). Due to delays in sub-grant contract negotiations, this questionnaire (Annex 4D) will be administered in June 2019 (Q1 Year 2) instead as by the end of year 1 as originally planned.

Activity 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. Baseline for both yield and pesticide use will be captured in June 2019 (early stage of the socio-economic survey) through the socio-economic survey questionnaire (Annex 4D) mentioned earlier (Activity 1.1).

Activity 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. The survey of natural enemies will be initiated by NMK and UoN during the socio-economic survey to be held in June 2019 (Q1 Year 2).

Output 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.

Activity 2.1 One student and 4 technicians from UoN and KEPHIS trained in field recognition, collection, preservation, slide-mounting, digital photography and identification [COMPLETED] A 13 day training session started on 11 July until 27 July at NMK in Nairobi. Instead of having only one student and 4 technicians from UoN and KEPHIS, we decided to expand the session to members of all partner institutions. Thus 15 trainees (14 of whom finished the course and received certificates) were trained to collect and preserve specimens from the field, prepare microscope slides for specimen identification, and were familiarised with useful taxonomic characters for identifying scale insects. Several of them are intended to become trainers, to train students in learning institutions, as well as extension officers and farmers during the project and beyond. Planning and organising the training in Nairobi was challenging, essentially because of the limited number of microscopes (especially compound microscopes), small equipment and chemicals available on site. However, good coordination between NMK and KEPHIS allowed the training to be held in the most convenient conditions possible. A training manual was drafted for use on the training course (Annex 4A). This work is not complete and will require expanding to include new identification records and taxonomic illustrations. When complete, the final publication will form an important output from the project. Coverage in the draft: 23 families, 138 genera, 267 species. Length 145 pages; 25 copies were printed, bound and taken to Kenya. During the training, fresh specimens were sampled in the NMK Botanic Garden and at various sites outside Nairobi (Muguga, Thika, Mlolongo), and 80 microscope slide mounts prepared by the trainees during the course. NHM taxonomist expert Gillian Watson gave several talks on scale insect systematics and biology, as well as on integrated pest management case studies, all made available to the trainees on a Box shared folder.

Activity 2.2 At least 30 scale insect species recorded in target areas, with associated natural enemies. The insect survey did not start on the coast yet, but 39 new samples collected around Nairobi have been studied. So far we have found two new continental records for Africa, and new Kenya records for one family and 47 species, seven of which are new to science. This illustrates the current poor knowledge of Kenyan fauna, and of threats presented by alien introductions.

Activity 2.3 At least 250 farms in the three coastal counties visited. All species discovered entered in the National reference collection. The insect survey in the three coastal countries will start in June 2019 (Q1 Year2). In the meantime, the De Lotto collection of over 3,500 slides at KALRO in Nairobi, untouched since the 1970s, has been assessed, showing good preservation

but a need of re-curation. Specimens of newly recorded species (see activity 2.2) have been slide-mounted and will be deposited in reference collections in each of the institution partners.

Activity 2.4 At least 600 data records entered into a relational database (species identity, locality, date collected, host, natural enemies, images). This activity is planned for Q1&2 of Year 3, but all data associated to samples are temporarily stored in a shared Box folder where partners can upload their data.

Activity 2.5 At least 30 distribution maps produced. See activity 2.4.

Activity 2.6 Kenyan pest list reviewed to include scale insect species not recorded previously. This activity is planned for Q4 of Year 3. However, new records have already been listed and transmitted to KEPHIS in link with national phytosanitary services.

Output 3. Taxonomic researchers, parataxonomists and extension officers trained, and pest management decision chain implemented through identification capacity building among all stakeholders.

Activity 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. Initial training of 14 taxonomists occurred in July 2018 (see activity 2.1), and knowledge gained during this initial training will be reinforced by another training session in June 2019. Extension services in the three coastal counties will be trained on basic scale insect biology, collection, preservation and best agricultural practices, in June 2019 as well, and will be able to train more people all along the project.

Activity 3.2 NMK national collection of scale insects enhanced, and 4 institutional reference collections established at UoN, KALRO, KEFRI and KEPHIS. See activity 2.3.

Activity 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. A key to families occurring in continental Africa covering 23 families has been prepared, tested using the NHM collections and made available in the draft training manual (Annex 4A). Keys to genera in most of the families (except armored scale insects) have been prepared, tested using the NHM collections and made available in the draft training manual.

Activity 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. Six photosheets have been developed to train extension services on the coast in June 2019. At the same training session, CABI, in charge of developing these field identification aids, will discuss further the needs of extension services for internal training and for delivery of information to farmers and foresters.

Output 4. Best practices for improving management of scale insect pests developed, disseminated to raise key stakeholder awareness and capacity, and adopted by them.

Activity 4.1 Best practices intended to guide sustainable scale insect pest management practice developed by mid-year 2. This activity is planned for Q2&3 of Year 2. Results from the socio-economic survey (early stage) will be used (see activities 3.1 and 3.2).

Activity 4.2 Policy brief produced by the end of the project. This activity is planned for Q3&4 of Year 3.

Activity 4.3 Five media articles and radio programs every year of the project, for general public information. This activity has been postponed due to long negotiations with several partners involved in media campaigns.

Activity 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. Trainees belonging to UoN (one technician, one MSc student), NMK (one senior researcher, one research technician, two scientific associates), KALRO (two technicians), KEFRI (three technicians), KEPHIS (one entomologist, one chief inspector, two inspectors) and CABI (one project manager) have now

received the necessary basic knowledge on scale insect and their threats to agricultural production, and on the means to manage the pests without disturbing agro-ecosystems (see activities 2.1 and 3.1). They all now have the capacity to train more stakeholders from various categories, and to develop and disseminate appropriate informative material. The trainees will continue to collect scale specimens for slide preparation and identification. Training material (simplified photosheets) have been prepared to train extension services on the coast in June 2019 and further material needed to engage with more stakeholders will be discussed at the same time.

3.2 Progress towards project Outputs

Output 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. At the start of this project, the knowledge among extension workers, parataxonomists and taxonomists to collect, prepare and identify scale insects was non-existent in Kenya. The necessary training of trainers started in Q1 of Year 1 with the involvement of researchers, technicians and students of all partner institutions. They can now rely on dedicated manuals and reference collections to keep this capacity at high-standard, and use their skills to train parataxonomists and extensions services.

Output 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. Survey of scale insect and natural enemies on the coast couldn't start during Q2 of Year 1 due to long negotiations with the partners involved in collecting activities. However, initial prospections around Nairobi and collection studies have already led to the discovery of 47 species not recorded yet in Kenya, some of them on important fruit trees (coffee, pawpaw, guava, citrus and baobab), crops (cassava), fodder shrubs (*Calliandra* sp.) and ornamental (rose and golden shrimp plant).

Output 3. Taxonomic researchers, parataxonomists and extension officers trained, and pest management decision chain implemented through identification capacity building among all stakeholders. The project has already strengthened Kenyan national capacity for research and training in the field of scale insect and mealybug recognition. Local researchers, biologists and technicians have been trained in all six partner institutions, where the expertise and the reference facilities were absent before. In addition to training staff in key national institutions in charge of agriculture and biodiversity, we started to develop collections, databases, and printed identification manuals, all durable tools which will be used from now for further training of more stakeholders throughout the chain of decision.

Output 4. Best practices for improving management of scale insect pests developed, disseminated to raise key stakeholder awareness and capacity, and adopted by them. Most of the activities related to this output have not started yet and are due to be reported on in the next reports. At the start of this project, none of the stakeholders was aware of scale insect and mealybug threats nor of the sustainable agricultural practices to be used to manage scale insect pests. A range of scientists have already be trained to be trainers all along the project to disseminate information on environment-friendly practices and methods to develop pest-resilient agroecosystems among farmer communities.

3.3 Progress towards the project Outcome

Outcome: 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. Despite long negotiations with most of the partners which ended only recently with the signed

sub-grant agreements, strong progress has been made towards this in Year 1, with the capacity to identify scale insects and mealybugs enhanced in all partner institutions. All indicators still appear to be adequate, some of them being probably exceeded by the end of the project, especially regarding the improvement of local research infrastructures. Efforts to survey baseline yield and income of farmers and foresters communities will give results soon via the administered socio-economic questionnaire, and the same is expected regarding the engagement of coastal extension services.

3.4 Monitoring of assumptions

All assumptions still remain valid and no changes in assumptions occurred and none of the listed risk has affected the outcome or any of the outputs yet. Especially, Kenya has shown political stability since the beginning of the project which occurred after the end of the election period early in 2018. Another crucial assumption for this first year was the availability of sufficient equipment (especially microscopes) in good working order for training up to 20 to 25 trainees; a good coordination between NMK and KEPHIS allowed to successfully fulfil these needs.

3.5 Impact: achievement of positive impact on biodiversity and poverty alleviation

By the end of the project, target groups will have a better understanding of biodiversity issues linked to unsustainable agricultural activities, and stakeholders will implement environmentally friendly practices and manage scale insect pests with sustainable methods. During this first year of the project, local researchers and biologists have developed appropriate taxonomic skills through training to identify and monitor agro-biodiversity. The initial assessment of agrobiodiversity using parasitic wasps as indicator will start together with the first socio-economic survey in June 2019.

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, and by developing insecticide resistance. It raises production costs, resulting in smallholder debt; there are also negative impacts on human health and the environment such as water quality. Baseline for both yield and pesticide use will be captured in June 2019 (early stage of the socio-economic survey) through the socio-economic survey questionnaire (Annex 4D).

4. Contribution to the Global Goals for Sustainable Development (SDGs)

This project will contribute to the following SDGs:

Goal 2 (Zero hunger): in implementing resilient agricultural practices that increase smallholders' income.

- *Target: doubling the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers.* The project will develop extension services and increase knowledge among smallholder farmers and foresters. The training of trainers started successfully in year 1.
- *Target: 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.* The project will disseminate information on best practice for managing scale insect pests. Again, future trainers from all partner institutions have been trained successfully during year 1.

Goal 15 (Life on land): in implementing resilient agricultural practices that preserve land and soil quality

- *Target: 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.* This project will determine the threat to crops and indigenous

plants, especially forest trees, by invasive scale insects, and establish up-to-date pest and quarantine national lists. Several new records of scale insects and mealybugs of Kenya have been discovered already during this first year, including a few pests.

5. Project support to the Conventions, Treaties or Agreements

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*).

Training researchers and parataxonomists in identifying and monitoring invasive scale insect species as we did during this first year of the project helped in achieving the 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*. During this first year of the project, 15 taxonomists, all permanent staff from institutions dealing with IAS, have been trained to collect, preserve and identify scale insects and have been provided with a training manual which will be a remarkable resource in the future. Other durable facilities like reference collections have started to be established in several institutions.

Mr Charles T. Sunkuli, Principal Secretary and CBD National Focal Point for Kenya, sent a letter of support. Dr Wanja Kinuthia (NMK) and Dr Eston Mutitu (KEFRI) 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.

6. Project support to poverty alleviation

The project will mitigate the negative impacts of untargeted pesticide application on crop yields and smallholder debt, alleviating poverty. The project showed that one of the most dreadful scale insect pests recently introduced *Paracoccus marginatus* is now country-wide, and is impacting not only papaya but also vegetables and cassava. Another important plant pest worldwide, not recorded from Kenya before this project started, has been collected during this first year. It shows already how our initial training has increased awareness of scientists and extension services on scale insects and mealybugs. Complaints of farmers about scale insects, and especially mealybugs, will be paid more attention from now, and the project will continue to provide all stakeholders with the dedicated tools to manage scale insect threats in the country and beyond, with the ultimate goal to reduce poverty among smallholder farmers. Recognition of scale pests and damage symptoms will help to target the use of pesticides, 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. Actual baseline for impact on scale insect damage on smallholders yield and income will be captured at the beginning of year 2 through the socio-economic survey questionnaire (Annex 4D).

7. Project support to gender equality issues

The initial socio-economic survey will first establish farming capacities and responsibilities based on gender among the household, 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 good practice advice.

8. Monitoring and evaluation

The NHM project leader and NMK local coordinator lead the overall Monitoring and Evaluation process, ensuring that project activities are on track and outputs are delivered on time. The dedicated Steering Committee couldn't meet yet, due to long negotiations between NHM and several Kenyan partners. However, frequent discussions (on a weekly to monthly basis) occurred on Skype between the project leaders and all partner institutions leaders to mitigate as much as possible the consequences of these long negotiations. During these meetings, decisions were agreed on several key monitoring issues:

- advance payment to start activities
- assessment of the project impact on local capacity building
- production by KALRO and KEFRI of a draft socio-economic survey questionnaire as early as possible so that it can be administered on the coast as soon as sub-grant agreements have been signed

The initial plans for monitoring and evaluation will be fully in place in Year 2 of the project.

9. Lessons learnt

The main impediments were

- the absence of start-up funds for several partner institutions to start their activities
- belated decisions regarding the Intellectual Property Rights (IPR) section of the sub-grant agreement

The change from an initial contract stipulating that payment was made quarterly in arrears based on actual expenditure to a contract agreeing for payment in advance took several months to be agreed on. The IPR issue was resolved more easily, but took long to be applied due to communication problems (one partner experienced major defaults of their email system).

Signing 6 sub-grant agreements is certainly a long and challenging task which must be undertaken as early as possible, and major issues must be identified well in advance. Adaptation of institutional services to peculiar situations should be more reactive and inventive to make sure that activities are not dangerously postponed.

However, all partners have continuously shown strong interest for the project during this first year, as shown by the success of capacity building activities among scientists. The engagement of the partners in charge of the socio-economic survey and the delivery of a very useful questionnaire ready for administration is a good example on how some issues can be overcome successfully.

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

N/A

11. Other comments on progress not covered elsewhere

No other comments on progress.

12. Sustainability and legacy

The project has been given profile in the scientific community through its announcement on ResearchGate and through an oral presentation at the XVth International Symposium on Scale Insect Studies. CABI has also developed a page on the project available online (<https://www.cabi.org/projects/project/67610>). Locally, the project is well-known in the scientific community due to the engagement of key national institutions in charge of agriculture and biodiversity.

Fifteen local scientists have been trained during the first training sessions, and their skills will be reinforced in the upcoming session, which will be attended by more people. All are permanent staff from government institutions, which maximises the long-term impact of the project. The engagement of extensions services and farmers through outreach activities, together with publication of various multi-media campaigns employing printed leaflets, posters, and/or social media, will start in year 2.

The proposed original exit strategy is thus still valid. We successfully started to develop local expertise, and we think that publication of approved policy briefs will help to put sustainable management programs in place in three coastal counties and to increase crop yields in targeted households by the end of the project.

13. Darwin identity

The Darwin Initiative has been acknowledged in all meetings and training sessions. The link to the DI website is displayed on the project dedicated page at CABI (<https://www.cabi.org/projects/project/67610>). The logo has been used on every document produced for both internal or external diffusion: training manual, attendance certificates, questionnaire...

14. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2018 – 31 March 2019)

Project spend (indicative) since last annual report	2018/19 Grant (£)	2018/19 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Monitoring & Evaluation (M&E)				
Others (see below)				
TOTAL				

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2018-2019

Project summary	Measurable Indicators	Progress and Achievements April 2018 - March 2019	Actions required/planned for next period
<p>Impact</p> <p>Improve awareness, response time and implementation of appropriate management strategies against threats to agro-biodiversity by invasive species</p>		<p>Awareness greatly improved for staff in six major agricultural institutions through training. All partner institutions engaged via sub-grant contracts and advance payment to allow start of activities.</p>	
<p>Outcome</p> <p>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.</p>	<p>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</p> <p>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</p> <p>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</p> <p>0.4 By end of the project, at least 250 smallholder households display better scale insect management practices and</p>	<p>0.1 Questionnaire for gathering baseline data about perception and awareness ready. Training of taxonomists and scientists successful. Some of them will train the extension services who will in turn inform farmers and make them aware of sustainable pest management practices.</p> <p>0.2 Training of the trainers successful; staff from several key institutions ready to train extension services on the coast.</p> <p>0.3 Extensive training manual ready; extension draft information handout ready; first collected specimens on slide and ready to be deposited in the national collection and other reference collections.</p> <p>0.4 Questionnaire for gathering baseline data about current management methods ready. Change to be quantified later.</p> <p>0.5 To be quantified later.</p> <p>0.6 To be disseminated later.</p>	<p>Administer the socio-economic questionnaire on the coast and analyse data.</p> <p>Train extension services on the coast.</p> <p>Survey natural enemies.</p> <p>Survey scale insects and mealybugs in relevant sites as demonstrated by the socio-economic survey.</p> <p>Produce more identification keys and field aids.</p> <p>Produce a best practices document.</p> <p>Initiate media campaigns.</p> <p>One oral presentation at the next International Symposium on Scale Insect Studies.</p>

	<p>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>Output 1.</p> <p>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>Scientific staff from all major government agricultural institutions trained on scale insect biology, collection, slide-mounting and identification, and ready for training of extension services in the three coastal counties (see Section 3.2 and Annexes 4A, B & C).</p> <p>Questionnaire ready for administration on the coast in 250 smallholder farms to define baseline data on perception and awareness (Annex 4D).</p>	
<p>Activity 1.1</p> <p>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</p>		<p>Underway. Socio-economic survey questionnaire ready to be administered directly in farms at the coast.</p>	<p>Questionnaire administered in 250 farms in three coastal counties in June 2019.</p>
<p>Activity 1.2</p>		<p>Underway. Socio-economic survey questionnaire ready to be administered directly in farms at the coast.</p>	<p>Questionnaire administered in 250 farms in three coastal counties in June 2019.</p>

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			
Activity 1.3 NHM, UoN and NMK survey natural enemies at 250 smallholdings all along the project		To be conducted in Year 2 until Q3 of Year 3.	Collecting in farms selected from the socio-economic survey.
Output 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>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>One MSc student hired.</p> <p>We decided to train more people than staff from UoN and KEPHIS only, and scientists from all partner institutions have been trained (KEPHIS: 4; KALRO: 2; KEFRI: 3; UoN: 1 student and 1 Technical staff; CABI: 1; NMK: 3). See Section 3.2 and Annexes 4B & 4C.</p> <p>New records of scale insects for Kenya listed and forwarded to KEPHIS.</p>	
Activity 2.1. NHM trains students and technicians from UoN and KEPHIS to field recognition, collection, preservation, slide-mounting, digital photography and identification		Completed in July 2018.	Reinforcement training will be held at NMK in July 2019.
Activity 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		Underway. Sub-grant agreements signed with all partners. One MSc student hired.	Start the scale insect and mealybug survey in most relevant farms as demonstrated by the initial socio-economic survey.
Activity 2.3. NMK and UoN identify specimens with the scientific support of NHM, and enter them in the National reference collection, with corresponding slide		Underway. Thirteen different scale family recorded so far, including one not recorded so far. Twenty-six new	Identification of specimens will be made regularly until the end of Q2 of Year 3.

images and associated data. Duplicates are deposited in other institutions' smaller working collections and at the NHM		species records, including one new record for Africa.	
Activity 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		Underway. Data associated to specimens collected in year 1 gathered in a spreadsheet for later incorporation in the specimen database.	Data will be entered in the spreadsheet as soon as specimens are collected and photographed.
Activity 2.5. NMK produces distribution maps of scale insects including vegetation and crop production, with historical and recent outbreaks highlighted		Underway. Data associated to specimens collected in year 1 gathered in a spreadsheet for later incorporation in the specimen database.	Distribution maps will be produced from data associated to collected specimens.
Activity 2.6. KEPHIS reviews Kenyan pest list to include scale insects not yet recorded		Underway. New records transmitted to KEPHIS.	KEPHIS partners review the new records and communicate on pest species accordingly
Output 3. Taxonomic researchers, parataxonomists and extension officers trained, and pest management decision chain implemented through identification capacity building among all stakeholders	<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>3.2 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>Fifteen taxonomists have been trained in July 2018 at NMK (see Section 3.2 and Annexes 4B & D).</p> <p>One identification key to scale families for the whole African continent has been produced (see Annex A).</p> <p>Twenty-three keys to genera have been produced (see Annex A).</p> <p>Dozens of slides have been prepared which will be shared between partner institutions for constitution of reference collections (see Annex C).</p> <p>One set of handouts produced for training of extension service on the coast.</p>	
Activity 3.1 NHM trains taxonomic researchers (including technicians in participating institutions for continuity) on slide making and identification, digitisation, collection enhancement and curation		Completed. Taxonomic researchers have been trained on slide mounting and identification.	Train taxonomic researchers on collection enhancement and curation.

Activity 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	Underway. Handouts on basic scale insect recognition ready for use.	Train parataxonomists and extension officers on the coast in July 2019.
Activity 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	Underway. Good progress with one extensive training manual produced (Annex 4A)	Cover the armored scale insects.
Activity 3.4 CABI produces field identification aids, fact sheets and photo sheets which will be used by extension workers and NGOs to train farmers	Underway. Draft handouts ready to be used for initial training and improvement.	Discussions with extension services on the coast planned in July 2019 for best fit-for-purpose material production.
<p>Output 4.</p> <p>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>Initial list of best practices prepared by NHM. Needs to be discussed further with partners after the results from the socio-economic survey are known.</p> <p>Four plant quarantine officers from KEPHIS trained to scale insect taxonomy. (see section 3.2).</p>
Activity 4.1. KEPHIS produces a best practices document for sustainable scale insect pest management	To be conducted in Q2 and 3 of Year 2.	Draft document to be discussed and amended by KEPHIS when data from the socio-economic survey are known.
Activity 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	To be conducted in Q3 and 4 of Year 3.	Produce draft based on results of the socio-economic survey and the scale insect and natural enemies collected during field trips.
Activity 4.3. Mass media campaigns and programmes are prepared	Underway. Dedicated webpages on CABI website.	Report on project activities and progress in several media.

<p>Activity 4.4. All categories of stakeholders engaged through fit-for-purpose information materials and updated information websites, and working/quarantine lists</p>	<p>Underway. Awareness of institution team leaders, and capacity building at scientists and technician, and plant health officers levels.</p>	<p>Engage coastal county extension services and farmers.</p>
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Annex 2: Project's full current logframe as presented in the application form (unless changes have been agreed)

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Impact: Improve awareness, response time and implementation of appropriate management strategies against threats to agro-biodiversity by invasive species (Max 30 words)</p>			
<p>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.</p>	<p>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</p> <p>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</p> <p>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</p> <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>0.1 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</p> <p>0.2 Signed lists of surveyed individuals and training records; capacity assessment technical report based on pre- and post-project surveys</p> <p>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, 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>Kenya remains politically stable.</p> <p>Farmers and foresters want to make use of the knowledge provided by the extension services.</p> <p>Extension staff is motivated in transmitting new knowledge and pest management protocols to farmers and foresters.</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>Government ministries adopt the resulting policy brief</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>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 the project to ensure both the before and after surveys are successful.</p>
<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>2.1 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>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>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>2.3 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>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>3.2 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</p>	<p>3.1 Participant certificates and assessment records</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>Equipment (especially microscopes) in good working order is sufficient for training up to 20 to 25 trainees.</p>

	parataxonomists, 1 photo guide and at least 30 fact sheets for extension officers developed by end of year 2		
4. Best practices for improving management of scale insect pests developed, disseminated to raise key stakeholder awareness and capacity, and adopted by them	<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>
<p>Activities (each activity is numbered according to the Output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)</p> <p>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</p> <p>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</p> <p>1.3 NHM, UoN and NMK survey natural enemies at 250 smallholdings all along the project</p> <p>2.1 NHM trains students and technicians from UoN and KEPHIS to field recognition, collection, preservation, slide-mounting, digital photography and identification</p> <p>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</p> <p>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</p> <p>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</p> <p>2.5 NMK produces distribution maps of scale insects including vegetation and crop production, with historical and recent outbreaks highlighted</p> <p>2.6 KEPHIS reviews Kenyan pest list to include scale insects not yet recorded</p> <p>3.1 NHM trains taxonomic researchers (including technicians in participating institutions for continuity) on slide making and identification, digitisation, collection enhancement and curation</p>			

- 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

Annex 3: Standard Measures

Table 1 Project Standard Output Measures

Code No.	Description	Gender of people (if relevant)	Nationality of people (if relevant)	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
2	Number of people to attain Masters qualification (MSc, MPhil etc.) *	Male	Kenyan	0			0	1
6A	Number of people to receive other forms of education/training (which does not fall into categories 1-5 above) *	9 male, 6 female (year 1)	Kenyan	15			15	43
6B	Number of training weeks to be provided			2			2	5
7	Number of (i.e., different types - not volume - of material produced) training materials to be produced for use by host country			1			1	3
9	Number of species/habitat management plans (or action plans) to be produced for Governments, public authorities, or other implementing agencies in the host country			0			0	1
10	Number of individual field guides/manuals to be produced to assist work related to species identification, classification and recording			0			0	1
11A	Number of papers to be published in peer reviewed journals			0			0	3
11B	Number of papers to be submitted to peer reviewed journals			0			0	3

12A	Number of computer based databases to be established and handed over to the host country			0			0	1
12B	Number of computer based databases to be enhanced and handed over to the host country			0			0	1
13A	Number of species reference collections to be established and handed over to the host country(ies)			0			0	4
13B	Number of species reference collections to be enhanced and handed over to the host country(ies)			0			0	2
14B	Number of conferences/seminars/workshops attended at which findings from Darwin project work will be presented/disseminated.			0			0	1
21	Number of permanent educational/training/research facilities, structures, or organisations to be established and then continued after Darwin funding has ceased			0			0	1
23	Value of resources raised from other sources (i.e., in addition to Darwin funding) for project work							

Table 2 Publications

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

Annex 4 Onwards – supplementary material (optional but encouraged as evidence of project achievement)

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@itsi.co.uk putting the project number in the Subject line.	Yes
Is your report more than 10MB? If so, please discuss with Darwin-Projects@itsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	No
Have you involved your partners in preparation of the report and named the main contributors	Yes
Have you completed the Project Expenditure table fully?	Yes
Do not include claim forms or other communications with this report.	