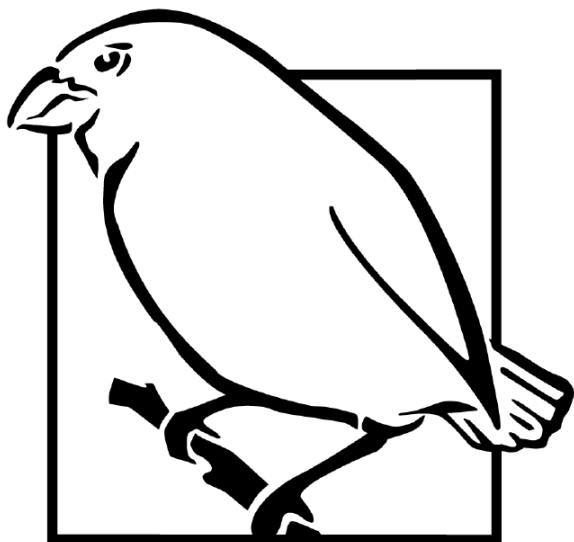


Newsletter

March 2021



Under the watchful eyes of the local wildlife, Kelvin Floyd sprays bittercress with Grytviken in the background, Credit: Indigena field team



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The Darwin Initiative supports developing countries to conserve biodiversity and reduce poverty. Funded by the UK Government, the Darwin Initiative provides grants for projects working in developing countries and UK Overseas Territories (OTs).

Projects support:

- the Convention on Biological Diversity (CBD)
- the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- the Nagoya Protocol on Access and Benefit-Sharing (ABS)
- the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)
- the Ramsar Convention on Wetlands
- the Convention on the Conservation of Migratory Species of Wild Animals (CMS)
- the United Nations Framework Convention on Climate Change (UNFCCC)


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A lush carpet of native plants on Redonda in 2020, Credit: Sophia Steele, FFI

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Mikania cleared area in Pathibhara Kalika Community Forest, the area has been covered for two decades, Credit: Lila Nath Sharma

Publicity and information about the Darwin Initiative

For more information on the Darwin Initiative please visit [gov.uk/government/groups/the-darwin-initiative](https://www.gov.uk/government/groups/the-darwin-initiative)

For further details about current and completed Darwin Initiative projects, including their final application forms, please visit darwininitiative.org.uk

We also have a blog, that includes news and thoughts on issues being tackled by the Darwin Initiative – both at the project and programme level. You can read it here blog.darwininitiative.org.uk

We're also keen to share other Darwin project blogs. If you have a blog you'd like to share on our website, please get in touch at darwin-newsletter@ltsi.co.uk

Publicity and referencing Darwin Initiative

We kindly remind project leaders that if they are publicising their work then it is important that they make every effort to mention Darwin Initiative funding. This is important as it helps us to ensure the Darwin Initiative retains a high profile and secures continued Government funding.



Local people cleaning Mikania invaded area in Pathibhara kalika Community Forest, Credit: Lila Nath Sharma

A word from Darwin

Due to the restrictions as a result of the global pandemic, many people have been unable to travel internationally in the past year. International travel for both business and leisure has become somewhat of a norm, and we are now able to enjoy having ready access to a wide variety of goods from around the world, courtesy of globalisation. Although this comes with many benefits, it also risks the introduction of non-native, or alien, species.

Despite the fact that some non-native species live in their new environments without any obvious negative impacts, others can become invasive. These alien invasive species often quickly adapt to their new surroundings, reproduce rapidly and can cause significant harm to local biodiversity. Some alien species can be introduced intentionally in an effort to control local pests, or even as part of the pet trade, whereas others may be accidentally introduced through stowing away in ballast water on ships or hiding away in shipping containers.

This **World Wildlife Day** we want to bring attention to the threats caused by invasive alien species on local biodiversity in the "Alien Invasions" edition of the Darwin newsletter.

Join us as we hear from projects on how they are tackling the issue of alien invasions from South Georgia, Mount Kenya and even the island of Redonda in the heart of the Caribbean. In this version of the newsletter you will discover some of the innovative ways projects are controlling these invasions in an effort to give local species a fighting chance.

In this edition we also wanted to celebrate the launch of the new Darwin Initiative website and the very first dedicated website for Darwin Plus projects, at the below links!

- <https://www.darwininitiative.org.uk/>
- <https://dplus.darwininitiative.org.uk/>

On the new websites you will be able to find project resources such as reporting forms, previous newsletters and change request templates and also search for other Darwin and Darwin Plus projects by lead organisation, target country and even biome! We hope that you find the websites a useful resource and welcome any feedback to help improve their usability.

We hope you enjoy this edition of the newsletter!



A pair of Black-headed Lapwings stand in front of a *Prosopis* stump at a cleared area at the Tana River Delta, Credit: Odera George

Invasive *Prosopis* poses a threat to Tana River Delta's survival

The Tana River Delta is a designated Ramsar site, an Important Bird Area and a Key Biodiversity Area. The Delta is also the second most important estuarine and deltaic ecosystem in Eastern Africa. It forms the northern limit of the Eastern Arc Mountains and Coastal Forests biodiversity hotspot, and is a proposed World Heritage Site. The ecosystem supports local communities and enormous numbers of livestock, wildlife and water birds. Tana River Delta is home to a plethora of unique and endangered species including the endemic Tana River colobus (*Ptilocolobus rufomitratu*s).

Prosopis juliflora, otherwise referred to as *Prosopis* and commonly known as "Mathenge" in Kenya, is a small, fast growing, drought-resistant, evergreen tree of tropical American origin. The tree, classified as a woody weed, is an alien species in Kenya. It was introduced in 1982 as part of the Fuelwood Afforestation Extension project to help reduce soil erosion, provide fodder for livestock and help reduce the effects of dust storms in arid and semi-arid areas.

Since then, however, the species has become unmanageable due to its fast proliferation and ability to resprout after cutting. Tana River County is among the many counties including Baringo, Garissa, Isiolo, Wajir, Samburu and Marsabit where the tree has widely spread.

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Prosopis was introduced in 1982 as part of the Fuelwood Afforestation Extension project to help reduce soil erosion, provide fodder for livestock and help reduce the effects of dust storms in arid and semi-arid areas
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Despite being introduced to Kenya with good intentions, the species is causing havoc and none of the residents in Tana River County wants to hear about it.

During a meeting convened by Nature Kenya to assess the level of seed collection, residents of Tana Delta county termed the weed a nuisance. They explained that it has continued to take over grazing fields by



Prosopis juliflora invaded a section of the Tana River Delta swept by floods, Credit: Odera George

forming impenetrable thickets which do not allow grass to grow underneath. “Residents here at the Tana Delta largely depend on pastoralism. The Mathenge weed has colonised our grazing fields and replaced grass. Before the plant was introduced, there was a particular type of grass which our livestock fed on. Sadly, it is no longer there in the fields that have been taken over by Mathenge,” says Ali Odo, chairperson of Burakofira Village Natural Resource and Land Use Committee (VNRLUC).

“
Due to its deep-rooted nature and ability to grow back quickly when cut, Prosopis is highly invasive and hard to control once established

Prosopis produces masses of pods containing small tough seeds. When pods are eaten by livestock, seeds pass easily through the gut. This creates a rich seed bank in the soil. Once in the soil, seeds can lie dormant for long period of time, until conditions are favourable. Due to its deep-rooted nature and ability to grow back quickly when cut, Prosopis is highly invasive and hard to control once established. Restoration and Biodiversity Extension Officer at Nature Kenya, Mr. Elias Komora, observed that the rate at which Prosopis is spreading in Tana Delta is very high. The spread, he says, is accelerated by livestock influx from the upper part of Tana River and the North Eastern region where the species is rampant.

The main challenge facing the livestock-farming communities in Tana River is that they have to walk long distances in search of pasture and water as a result of Prosopis invasions on grazing fields. Massive loss of croplands has also been experienced in areas ravaged by Prosopis. Farmers have had to incur extra costs of clearing thorny bushes to create space for farming.

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The species has replaced native vegetation, taking over rangelands and is rapidly replacing natural grasslands, turning them into dense thorn woodlands

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Prosopis is also contributing to the loss of biodiversity at the Tana River Delta. The species has replaced native vegetation, taking over rangelands and is rapidly replacing natural grasslands, turning them into dense thorn woodlands. This has lowered the aesthetic nature of the land which has reduced the area's appeal to tourists. Livestock has also been affected by Prosopis, goats have lost their teeth due to feeding on the shrub's pods and some have even died as a result.

Efforts to control the spread of Prosopis are underway, and despite the difficulties it poses, there remains some hope. Communities are finding ways of utilising the plant to produce charcoal and for building materials. Manual clearing of the plant in farmlands is also being explored, this involves cutting the plant at the stem then burning it to prevent regeneration. Prolonged flooding has also helped to control the plant. The Tana River County government is also in the process of establishing green spaces as part of implementation of the Tana River Delta Land Use Plan. This initiative will involve massive clearing of the Prosopis plant.

“Prosopis is a difficult species to handle. However, it presents opportunities to be used for energy, building, fencing poles and burning bricks. Kenya Forest Research Institute has been doing a lot of research towards its eradication,” Assistant Chief Conservator of Forests and Head of Forest Health and Biodiversity at the Kenya Forest Service Dr James Mwang'ombe says.

For more information on project 24-013, please click [here](#).



Redonda before the restoration project, devastated by rats and goats, Credit: Jenny Daltry, FFI

Removing aliens triggers rapid recovery on the Caribbean's "highest priority island"

When we began the project we expected improvements, but we never imagined the changes would happen so quickly! Since the removal of feral goats and rats in 2017, the remote Caribbean island of Redonda (part of Antigua and Barbuda) has been transformed from bare rock to a green haven, where native plants and animals are flourishing once more. The Redonda ground dragon (*Pholidoscelis atratus*) – one of several endemic Critically Endangered lizards – has increased by more than six-fold and the Redonda tree lizard (*Anolis nubilus*) by eight-fold. Hundreds of new trees have sprung up, invertebrate abundance has increased significantly, and at least 13 species of land birds have recolonised the island.

Nobody knows when the alien mammals first appeared on Redonda, but their impact was catastrophic. Thousands of black rats (*Rattus rattus*) hunted and dispatched the native reptiles and seabird chicks while the feral goats (*Capra hircus*) demolished the island's vegetation until more than half of the herd died from starvation. A regional priority-setting exercise pinpointed Redonda as the island in direst need of restoration.

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The Redonda Restoration Programme set out to rehabilitate a healthy island ecosystem that is sustainably managed for the conservation of indigenous biodiversity, and to preserve Redonda's important historical values and facilitate the sustainable use and enjoyment of Redonda by present and future generations

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The Redonda Restoration Programme set out to 'rehabilitate a healthy island ecosystem that is sustainably managed for the conservation of indigenous biodiversity, and to preserve Redonda's important historical values and facilitate the sustainable use and enjoyment of Redonda by present and future generations'. Surveys and consultations began in 2009, and the Darwin project was officially launched in 2016 by the Government of Antigua & Barbuda, the Environmental Awareness Group (EAG) and Fauna & Flora International (FFI).

“

This has been the opportunity of a lifetime – witnessing the rebirth of an island. Changes forecasted to happen in five years occurred within months

”

- *Shanna Challenger, Project Coordinator*

It took seven months of carefully orchestrated teamwork to catch the remaining goats and remove every rat. FFI has successfully removed alien mammals from over 25 islands since 1995 but this rugged island posed new challenges. Severe erosion, caused by deforestation, had left many parts of Redonda dangerously unstable, with crumbling cliffs, scree (small loose stones) and frequent rock falls. To reach the alien mammals safely, the operation relied on rope access experts from the UK, supported by a local ground crew and skilled helicopter pilots. The goats were airlifted to Antigua's Veterinary and Livestock Division, to study and conserve the rare breed. The rodents were successfully targeted using Klerat™, a brodifacoum-laced bait (pesticide) that is irresistible to rats but unpalatable to birds and reptiles.

Shanna Challenger, Project Coordinator for the EAG and FFI, said “This has been the opportunity of a lifetime – witnessing the rebirth of an island. Changes forecasted to happen in five years occurred within months.”

Together with FFI Project Leader Dr Jenny Daltry, Shanna documented the new shrubs and trees that appeared in 2018; the first to germinate on Redonda for more than a century. As its habitats recover, the project team is making plans to reintroduce some missing keystone species, such as the black iguana (*Iguana melanoderma*).

Speaking for the Department of the Environment, Dr Helena Jeffery Brown adds “The Government of Antigua & Barbuda considers the return to life of Redonda as a shining beacon in our collective efforts towards ecosystem restoration and biodiversity conservation that will bring us another step closer to attaining some of the Aichi Biodiversity Targets.”



Rat eradicators abseiled down Redonda's cliffs, Credit: Bede West, FFI

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The high-profile restoration effort caused great excitement on Antigua and Barbuda, and prompted the Government's decision in 2019 to create the Redonda Ecosystem Reserve. The new protected area encompasses not only the island but its surrounding coral reefs, extending nearly 30,000 hectares.

According to Mike Appleton, a protected area specialist from Global Wildlife Conservation who helped develop the Redonda Ecosystem Reserve management plan, “Removing the alien mammals has catalysed the creation of one of the biggest protected areas in the Caribbean. More than this, it has opened our eyes to how incredibly resilient nature can be when we make the effort to remove these threats”.

For more information on project 23-003, please click [here](#).



Non-native Cerastium fontanum and an unknown member of the Poaceae family germinated from a South Georgia soil sample”, Credit: Rosemary Newton

Righting the wrongs of the past - invasive species removal from South Georgia

The sub-Antarctic island of South Georgia, part of the UK Overseas Territory of South Georgia and the South Sandwich Islands, is located approximately 1,700 km east of the southernmost tip of South America. This wildlife haven for native birds and marine mammals was, until recently, significantly impacted by intentional introduction of reindeer and the unintentional introduction of rodents from the sealers and whalers that first inhabited the island. Invasive non-native species are one of the most significant drivers of biodiversity loss globally, the impacts of which are particularly severe on islands.

“ Invasive non-native species are one of the most significant drivers of biodiversity loss globally, the impacts of which are particularly severe on islands ”

The Government of South Georgia and the South Sandwich Islands (GSGSSI) is committed to removing non-native species, conserving native species, and restoring the native habitats of this beautiful island.

Reindeer were successfully removed in 2014 and the island was declared rodent free in May 2018 through the support of Darwin Plus funding (**DPLUS048**). In response to the predicted grazing pressure release following mammal eradication, a non-native plant management strategy was developed as part of **DPLUS015**. This programme to eradicate 33 of the 41 non-native plant species from the island and to limit the spread of the most invasive species commenced in 2016.

Experienced members of Indigena Biosecurity International have been implementing this strategy, primarily using targeted herbicides for plant control. However, eradication of non-native plant species can be exceedingly difficult because of the formation of a soil seed bank from which plants regenerate, often for many years.

In 2018, the Royal Botanic Gardens, Kew, along with project partners Durham University and Indigena, was awarded Darwin Plus funding (**DPLUS080**) to secure South Georgia's native habitats following invasive species control. The current project aims to assess the effectiveness of the non-native plant eradication by monitoring vegetation changes following control and by estimating the risk of non-native plant species persisting after 2020 from soil seed bank and seed viability studies.

The potential for the more widespread non-native plant species to spread into and colonise new areas following glacial retreat is being quantified using seed dispersal traps. Seeds and spores of native plants and fern species have also been collected for conservation at Kew's Millennium Seed Bank. The outcomes of this project will inform the continued invasive plant species management on the island, a long-term commitment of GSGSSI.

Extracting seeds from South Georgia soil samples has proven to be more challenging than initially anticipated due to quarantine restrictions of the Defra soil licence for working with imported soil. Nevertheless, Kaitalin White, a joint Kew and Queen Mary University of London Masters student, analysed 20 samples from different field sites, extracting over 600 seeds and seed fragments, of which 122 were full seeds and 51 were viable. Viable seeds comprised four native, four non-native and several unknown species, which will be identified by molecular means. As this seed extraction method is very time consuming, subsequent soil work is being carried out using a different approach. This approach uses a thin layer of South Georgia soil spread over a layer of sterile sand on heat-treated compost (to kill any seeds present in the compost mix) and watered, which enables more soil to be screened for seeds. Seedlings are identified where possible and all seedlings then harvested for identification by molecular techniques.

Thirty custom-built bucket seed traps were installed on South Georgia at the beginning of the field season and

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The potential for the more widespread non-native plant species to spread into and colonise new areas following glacial retreat is being quantified using seed dispersal traps

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collected by the field teams before leaving the island. In the first field season, 748 seeds were collected, of which 218 were empty seed husks. The remaining 530 full seeds were identified from seed coat morphology as native (5%) or non-native (62%, with *Taraxacum officinale* and *Cerastium fontanum* being the most abundant), while 33% were unknown, and will be identified by molecular analysis.

Covid-19 luckily did not negatively impact on the field work too much, although it did bring the field season to an abrupt halt as staff were evacuated early. However, progress in the laboratory has been delayed by more than six months due to the lockdowns. The Millennium Seed Bank is now Covid-secure, laboratory work has recommenced, and we look forward to being able to report back further on our findings in a future issue of the Darwin newsletter.

For more information on project DPLUS080, please click [here](#).



Kaitalin White extracting seeds from soil samples under quarantine conditions in the Millennium Seed Bank lab, Credit: Rosemary Newton



Chromolaena and Mikania invaded area in Diyalo Community Forest, Credit: Lila Nath Sharma

Concepts to operation: shifting practices of *Mikania* management in Jalthal forest, Nepal

Jalthal forest is a 6,000 ha highly biodiverse remnant of a once more widespread ancient moist tropical forest in the lowlands of south-east Nepal. Now surrounded by agricultural fields and settlements, this extraordinary biodiversity-rich forest, comprising several distinct ecosystems, provides a habitat for several threatened species of plants and animals, including the iconic Asiatic elephant (*Elephas maximus*) and pangolin. The forest is also an important source of ecosystem services and provides fresh water and forest products such as timber, firewood, fodder, wild berries, leafy vegetables and mushrooms. It is currently being managed by 22 Community Forest User Groups and is important to the livelihoods and culture for over 80,000 people. Despite its high ecological and socio-economic significance, Jalthal forest has been subjected to multiple pressures, including invasive species, human-wildlife conflict (particularly human-elephant), poaching and illegal felling of trees.

For the last two decades, the forest has been heavily invaded by the invasive alien plant *Mikania micrantha* popularly known as the 'mile-a-minute' and locally called pyangri lahara, which blankets the mid-canopy trees and ground vegetation.

Fast growth, production of large numbers of tiny wind-dispersed seeds, prolific vegetative reproduction and long seed viability makes control of this species challenging and complex. Past initiatives to control this harmful weed at the local level have not proven effective, due to the scattered and small-scale approaches. As a result, *Mikania* has continued to spread rapidly, seriously affecting forest ecosystems by hindering tree regeneration, smothering and killing seedlings and saplings, creating barriers for the easy movement of wildlife and humans inside the forest and reducing fodder availability for animals.

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The Darwin Initiative project led by Nepali NGO ForestAction in collaboration with Royal Botanic Garden Edinburgh and local stakeholders, has resulted in a new approach to the control of Mikania in Jalthal forest, and brought about positive changes in the knowledge and practice of Mikania management. These new approaches include:

Targeted bush removal: In the past, bush removal activities used to be a scattered, isolated, discrete events with no concrete long term plans. Now bush removal is targeted towards the invasive species and integrated into a long-term plan of forest restoration.

Revised timing of interventions: Bush removal used to be undertaken in the winter season, between December and February. This has been brought forward to prevent Mikania setting fruit and the shedding of vast numbers of air-borne seeds. The change to timing has also been designed to create a conducive environment for saplings to grow: Mikania is removed prior and during the maximum growth period of saplings.

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These changes in management of Mikania, and the forests it invades, have seen the successful clearance of this invasive species in over 350 ha of Jalthal forest, resulting in the rescue of 110,000 seedlings and saplings
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Selective bush removal: Previously, indiscriminate bush clearing used to include the removal of saplings of less economically useful, but ecologically important species. Now, local people are aware of the value of protecting these species, and are caring for the saplings of these other species too by removing only the invasive plants, and thereby promoting biodiversity.

Promotion of native species: The common practice of planting of exotic tree species has now shifted towards encouragement and protection of existing natural regeneration, supplemented by the plantation of native species. "We realise that we have plenty of seedlings in the forest so we are now concentrating on protection and nurturing of the existing regeneration rather than going for the lengthy and costly process of plantation", said Chiranjibi Paudel of Pathibhara Kalika Community Forest.

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This project is not only helping to lay a foundation for the future of Jalthal forest, but also the successes of this the ecologically informed and locally led approach will have wider impact for invasive species management in other community forests degraded by Mikania
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Biomass recycling: In the past, the biomass of the cut bush either used to be burnt or left to decompose, but now the project is supporting Community Forest User Groups to convert the biomass into compost so that Mikania management can sustain and also help improve soil quality.

These changes in management of Mikania, and the forests it invades, have seen the successful clearance of this invasive species in over 350 ha of Jalthal forest, resulting in the rescue of 110,000 seedlings and saplings. Forest restoration and Mikania control demands significant time, perseverance and investment by Community Forest User Groups, but the results are encouraging, even after a relatively short time and the restriction of activities due to the global pandemic. Their commitment to this, and towards the long-term goal of forest restoration and biodiversity conservation, is now enshrined within their community forest management plans.

These local initiatives have been supported by new national laws which oblige Community Forest User Groups to invest 25% of their income into forest conservation. This in turn boosts livelihoods, as local youths and disadvantaged people are now receiving income for their work in managing Mikania infestations. This project is not only helping to lay a foundation for the future of Jalthal forest, but also the successes of this the ecologically informed and locally led approach will have wider impact for invasive species management in other community forests degraded by Mikania.

For more information on project 26-022, please click [here](#).



Training local Government staff in ant surveying methods Credit: Natasha Stevens

Conserving St Helena's endemic invertebrates through invasive invertebrate control

St Helena is a small (47 square miles) UK Overseas Territory in the South Atlantic Ocean, with a population of around 4,500 people. In addition to its human population, the island is home to over 420 endemic terrestrial invertebrate species, making it a location of immense global importance. Unfortunately, many of these endemic species are under threat from invasive alien invertebrate species. An innovative new project led by the St Helena National Trust will facilitate endemic invertebrate recovery and re-establish their associated ecosystem functions by testing and establishing invasive invertebrate control methods. The focus will be on three of St Helena's most invasive species, the common wasp (*Vespula vulgaris*), big-headed ant (*Pheidole megacephala*) and the springbok mantis (*Miomantis caffra*).

Whilst the common wasp and springbok mantis can be found island-wide, the wasp is particularly fond of the endemic cloud forest which hosts over 200 endemic invertebrate species. Both species are generalist feeders, preying upon a range of endemic invertebrates. The springbok mantis is often observed feeding on invertebrates which are attracted to nightlights, including endemic moths.

Common wasps are not only a threat to biodiversity but are a nuisance to people and agriculture because they have a nasty sting and hinder production of fruit and honey.

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Common wasps are not only a threat to biodiversity but are a nuisance to people and agriculture because they have a nasty sting and hinder production of fruit and honey
”



St Helena team engaging with the public at an information stall, Credit: Liza Fowler



St Helena team member deploying wasp beer traps and surveying ants, Credit Liza Fowler



Ants are a particular problem species for the island because they feed on endemic invertebrates and can damage native habitats. Ants rear other pest species such as aphids which threaten native plants and reduce abundance of beneficial invertebrates such as ladybirds. The big-headed ant also poses a threat to vertebrates and has been known to attack globally threatened St Helena plover chicks in their nests (known locally as the wirebird).

We aim to begin trialling the control methods for the common wasp and big-headed ant in 2021. Insecticides will be used to target these species as they have shown positive success in other islands; the results will be carefully monitored to ensure that there are no unwanted impacts to local biodiversity.

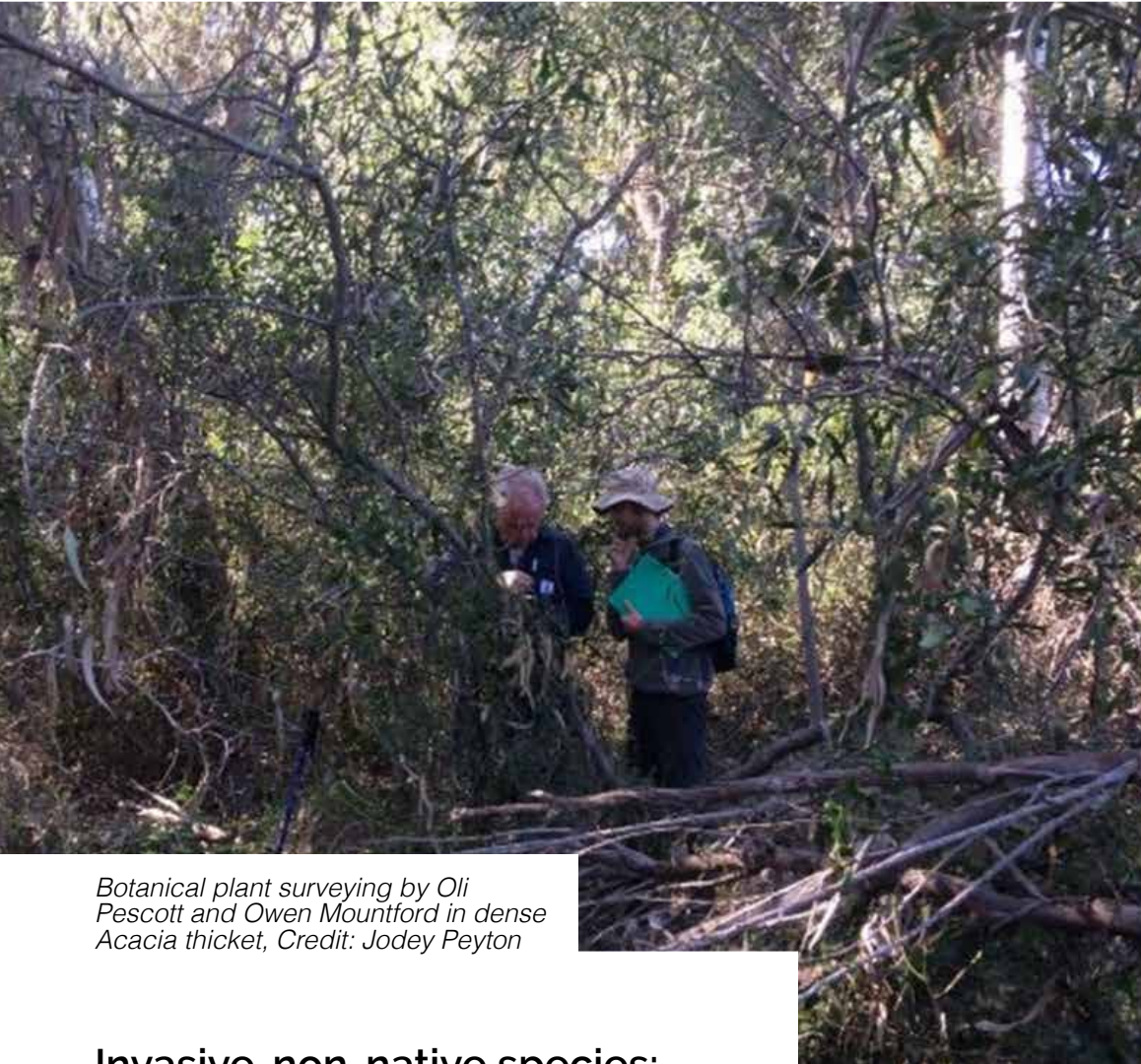
Control methods for the springbok mantis are currently under development and with the current lack of available resources the project will be one of the first to create and test methods specifically designed for the mantis.

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Insecticides will be used to target these species as they have shown positive success in other islands; the results will be carefully monitored to ensure that there are no unwanted impacts to local biodiversity
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To date, public engagement activities have included information stalls, workshops and citizen science programmes.

The local team of four, with support from international experts in the UK, New Zealand and South Africa, hope to increase local capacity and knowledge in the battle against these invasive invertebrate species.

For more information on project DPLUS104, please click [here](#).



Botanical plant surveying by Oli Pescott and Owen Mountford in dense Acacia thicket, Credit: Jodey Peyton



Invasive-non-native species: increasing understanding of their arrival and impact

People have a long history of moving animals and plants around. Sometimes we do this deliberately, through trade and agriculture, and other times plants and animals are unintentional hitchhikers, as stowaways on ships or within luggage.

Some species that are moved from one region of the world to another thrive in their new environments and can cause harm to native species and habitats. These species are known as invasive non-native species (INNS). In addition, they can also be a serious threat to human health, well-being and economies, with small island states being amongst the most vulnerable to biological invasions.



The project aims to increase production efficiency, secure access to markets and as a result, income, as well as reducing overexploitation of natural resources and conflict with wildlife



Biosecurity practices and communications campaigns are an effective way of reducing the threat posed by INNS. By sharing understanding of the potential problems caused by these species, we can help people protect their local environment, and reduce the arrival and spread of INNS. People can also contribute to early-warning and surveillance by reporting sightings of species that may be of concern or tracking the spread of INNS when they arrive. This is made possible by a range of technologies including alert systems using online recording and remote sensing and even contributing samples for analysis of environmental DNA.

Through our two Darwin Plus projects ([DPLUS056](#) and [DPLUS088](#)) we have been raising awareness of INNS and increasing understanding of how INNS might impact the habitats in the Sovereign Base Areas (SBAs) of Cyprus. There are broadly five designated areas within the SBAs on Cyprus: Akrotiri (SPA/SAC/Ramsar), Episkopi (SPA/SAC), Dhekelia SAC, Ayios Nicolaos SAC and Cape Pyla SAC. Habitats include internationally important wetland and saltmarsh at Akrotiri, garrigue scrub, eucalyptus forest and agricultural land. In 2017 and 2019, we led two collaborative horizon scanning activities in partnership with many stakeholders across Cyprus. We assessed the potential of INNS to arrive, establish and have negative impacts in Cyprus.



View flying south over Lake Akrotiri. The Acacia and Eucalyptus forest is at the northern shore of the lake, Credit: Wolfgang Rabitsch

We considered which INNS could be the greatest threat to biodiversity and ecosystems but also human health and the economy. Horizon scanning can lead to prioritisation of INNS to inform decision-making and action, such as informed pathway action planning and communication campaigns. We have since used the horizon scanning approaches we developed to develop priority lists of potential INNS arrivals for all of the UKOTs. We have developed an INNS and biosecurity section of our **Darwin project website**, using information from the **GB Non-Native Species Secretariat website** which outlines ways in which how we can all act to help prevent unwanted plant and animal species or pests and diseases arriving.

Through mapping the distributions of species, it is possible to understand the extent to which INNS are present in an area. Data from these surveys can then be used to inform management and eradication planning. We undertook intensive surveying across the two projects, recording over 10,000 occurrences of native and non-native species in the SBAs and publishing these through the UKCEH Environmental Information Data Centre, and most recently, the Global Biodiversity Information Facility (GBIF).

“ We have developed an invasive non-native species and biosecurity section of our Darwin project website, using information from the GB Non-Native Species Secretariat website which outlines ways in which how we can all act to help prevent unwanted plant and animal species or pests and diseases arriving ”

Publishing on GBIF ensures that these species datasets are available to everyone. We also developed ways to encourage public involvement in wildlife surveys (both marine and terrestrial) through citizen science. Working with the teachers at the Akrotiri Environmental Education Centre, we adapted the UK Pollinator Monitoring Scheme for use in Cyprus by initiating the **Pollinator Monitoring Scheme** Kýpros (**PoMS-Ký**) and **Mini-PoMS-Ký** for young children. It is exciting to see these schemes being promoted through Darwin Fellowship **DPLUS101**, which is also featured in this newsletter.

Through DPLUS056, we created an interactive non-native species database called 'CyDAS', the Cyprus Database of Alien Species. This database provides information on non-native species recorded in Cyprus.

Such databases provide a really useful resource for land managers and policy makers to monitor changes in taxa in a location. By working together, we can share knowledge and experience and increase understanding of the challenges and opportunities we have around tackling INNS. Across our projects, we have been undertaking capacity building work. We created an interactive infographic, which can be found [here](#). It highlights the major threats to wetlands. We developed it in partnership with the teachers at the Akrotiri Environmental Education Centre, alongside a wetland animal identification guide for the Akrotiri salt lake, for use by staff and students for monitoring wetland species. We also have provided training to SBA staff in using software to support them in management decision making.

Raising awareness of INNS is critical to ensuring we can work together to protect the special places in which we live. We have created miniguides to help highlight key species for the public to keep an eye out for in Cyprus. We also co-hosted, with the EU Cost Action network CA17122 **Alien CSI**, a Bioblitz in March 2019. This was the first Bioblitz for Cyprus.

“ We developed the infographic in partnership with the teachers at the Akrotiri Environmental Education Centre, alongside a wetland animal identification guide for the Akrotiri salt lake, for use by staff and students for monitoring wetland species ”

The participants in this Bioblitz included people from the COST Action but also ecologists from the RIS-Ký team and citizen scientists from the Sovereign Base Area.

We have been extremely privileged to have the opportunity of working with fantastic partners and stakeholders across Cyprus and Europe through these two projects over the last four years. We have all learnt so much. We would like to thank the Akrotiri Environmental Education staff for their incredible support during the times when we could host in person meetings.

For more information on projects **DPLUS056** and **DPLUS088**, please follow the links.



Some of the highlights of the 2019 Bioblitz, Credit: Jodey Peyton



Community members clear *L. camara* bushes at the Lower Imenti forest in Mount Kenya, Credit: Milka Musyoki

Local community in Mount Kenya forest take lead in controlling invasive *Lantana*

The Mount Kenya ecosystem is one of Kenya's five main catchment areas and is one of the major sources of freshwater for the country. The ecosystem supplies water for electricity generation, irrigation, domestic and industrial use. Due to Mount Kenya's rich biodiversity and cultural heritage, it is one of Kenya's key tourist attractions. In addition to being a tourism hotspot, the ecosystem is also an important carbon sink that helps regulate local and global climate. The forests on Mount Kenya are a source of firewood, timber, livestock fodder and many other products.

At first glance, you would hardly imagine that *Lantana camara* is an invasive plant species. The allure of its brightly red, yellow, pink and orange coloured tubular-shaped flowers and their sweet fruity aroma is quite irresistible. In parts of Mount Kenya forest, however, this small perennial shrub is gaining a notorious reputation. A huge portion of the Lower Imenti forest has been invaded by *L. camara* and as a result the plant has become a dominant understory shrub with devastating consequences for the surrounding local foliage. The Kenya Forest Service Meru County Deputy Ecosystem Conservator Mr. Keneth Riungu notes that the Lower Imenti forest block has been significantly impacted by *Lantana camara* which now covers over 50 percent of the forest block. If not controlled, Mr. Riungu asserts, there will be negative impacts to the forest integrity. "Species diversity has

“ At first glance, you would hardly imagine that the *Lantana camara* is an invasive plant species. The allure of its brightly red, yellow, pink and orange coloured tubular-shaped flowers and their sweet fruity aroma is quite irresistible ”

significantly reduced due to *L. camara* colonising almost all of the forest. The shrub has caused the forest not to achieve normal succession due to its suppressing of young growing saplings,” adds Mr. Riungu.

Increased forest disturbance through deforestation, fire outbreaks and over-grazing has also heightened Lower Imenti forest susceptibility to the *L. camara* invasion. Its dense thickets have choked other indigenous tree species, significantly reducing the forest regeneration rate, those most at risk from this invasion are new indigenous trees species – many of which have experience a growth stall. “*Lantana camara* has allelopathic qualities which reduce the vigour of surrounding plants. This significantly slows down the growth of new indigenous tree species,” says Paul Gacheru, the Nature Kenya Species and Sites manager.



A community member plants an indigenous tree in an area cleared off *L. camara* shrubs at the Lower Imenti forest in Mount Kenya, Credit: Milka Musyoki

As well as threatening the forest cover and biodiversity, the shrub has also affected smallholder farms and livestock grazing areas, reducing pasture and growth of crops respectively. It has also made harvesting in farms more difficult. This, in turn, has taken a toll on community livelihoods in the area.

Several methods are currently being employed to control the invasive *L. camara* in Mount Kenya area. These include mechanical, chemical and biological control methods. The key to successful management of the shrub is the constant and repeated control of the regrowth. At Lower Imenti forest, physical clearing and uprooting of *L. camara* bushes and replacing them with fast-growing indigenous tree is being undertaken by different stakeholders who have partnered with Kenya Forest Service, Nature Kenya and the Lower Imenti Community Forest Association. The idea behind replacing *L. camara* with fast-growing trees is to increase the shade in areas affected by the weed. This prevents the re-establishment of the invasive plant. So far 1,500 ha have been cleared of the invasive *L. camara* and replanted with indigenous tree species such as *Croton megalocarpus*, *Markhamia lutea*, *Vitex keniensis*, *Maesopsis eminii*, *Bredillia micrantha*, *Cordia abyssinica*, *Teclea nobilis*, *Prunus africana*, *Acacia polyacantha* and *Acacia xanthophloea*.

Local communities in Lower Imenti are appreciative of efforts being made to contain the *L. camara* shrub.

“Community members engaged in the clearing and uprooting of the shrub are remunerated for their effort. We also supply indigenous tree seedlings that are planted to replace the *Lantana camara*,” says John Kairera, a member of the Lower Imenti Community Forest Association. Kairera has earned an income from selling indigenous tree seedlings and providing labour to clear and uproot *L. camara* bushes and planting trees. “I was able to pay schools fees for my children in January and also managed to complete construction of my house out of proceeds from the *L. camara* work. These proceeds have encouraged us as a community to continue partnering with stakeholders and work tirelessly to control the invasive *Lantana camara* for a better environment,” he adds.

Rehabilitating areas once occupied by *L. camara*, however, remains a challenge owing to the weed’s rampant regenerative nature. Constantly monitoring *L. camara*’s regrowth is key to eradication of the weed. The cost implications for doing this are high. Concerted efforts from all stakeholders are therefore required to effectively deal with the *L. camara* menace.

For more information on project 25-031, please click [here](#).



Counting insects visiting flowers on the Akrotiri Saltmarsh, Credit: Jodey Peyton

Understanding how invasive non-native species affect biodiversity across the Sovereign Base Areas, Cyprus

My Darwin Plus fellowship, which is in partnership with the UK Centre for Ecology and Hydrology and Joint Services Health Unit Cyprus, focuses on the Akrotiri wetland (part of the Sovereign Base Areas Cyprus). The main aims of the fellowship are to quantify ecosystem services from the wetlands that benefit local people, assess how different drivers, like the introduction of invasive species, impacts these benefits.

The past year has been difficult for many, primarily due to the global pandemic – however, these challenges have highlighted that it is more important than ever to recognise our connection with nature and the role we play in safeguarding the environment. Invasive non-native species can cause species declines and may act as vectors for disease, affecting both humans and wildlife. Biological invasions, climate and land use change, drought, forest fires, urbanisation and the expansion of the road networks are leading to biodiversity ecosystem change across Cyprus including the Sovereign Base Areas (SBAs).

The largest part of Akrotiri peninsula is situated within the British Western Sovereign Base Area (WSBA), which is an area with huge ecological value, and has been classified as Ramsar site.

My fellowship aims to address all drivers of ecological change and their impact on the provision of ecosystem services highlighting the importance of the Akrotiri Peninsula (Ramsar, Special Protection Area and Special Area of Conservation). The outcomes will be communicated to stakeholders from the SBAs and Republic of Cyprus as well as members of the public, with the hope that the methods developed as a result of this project, acting as a lesson learning opportunity for other UK Overseas Territories.

“ Biological invasions, climate and land use change, drought, forest fires, urbanisation and the expansion of the road networks are leading to biodiversity ecosystem change across Cyprus including the Sovereign Base Areas ”

The initial phases of the fellowship have identified the indirect and direct drivers of biodiversity and ecosystem change around the wetland (including invasive non-native species), and will go on to document the ecosystem services relevant to the Akrotiri wetland using various approaches such as Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Nature's Contributions to People, Classifying Ecosystem Services (CICES) and the Socio-Economic Impact Classification of Alien Species (SEICAT). We go on to apply and test the Toolkit for Ecosystem Service Site based Assessments (TESSA), and if it works well in the context of Akrotiri we will communicate the results to local stakeholders.

The citizen science based pollinator monitoring (Flower-Insect Timed Counts, or Poms-ký), component of the study will provide an effective way of raising awareness within the Akrotiri community regarding the importance of pollinators. Poms-ký is the first pollinator monitoring scheme in Cyprus that adopts a citizen science approach to record insects visiting flowers, providing an opportunity to address current gaps in knowledge on species populations and distributions across the island and to consider how those are affected by non-native plant species within habitats. Moreover, in order to involve and inform young people about insects and their importance and impacts of non-native plants and habitats on pollinators, we have developed a special version of PoMS-Ký specifically for elementary and high school children, the mini PoMS-Ký. We are also currently working on the design of an online game similar to "Guess Who" aimed at familiarising children with insects. The game aims at helping children as well as adults to develop basic skills in morphological insect identification.

I feel fortunate to have been part of this project. My involvement in this scientific project is giving me the opportunity to meet, collaborate and establish links with a number of stakeholders across the SBAs and Republic of



Figure 1: Honey bee visiting Eucalyptus flowers



Figure2: The beautiful Akrotiri marsh with cattle



Figure 3: FIT Count field recording form



Figure 4: Patch (50cm x 50cm quadrat), of a target flower to watch during the FIT Count

*Photos from Akrotiri Poms-ký fellowship,
Credit: Ioanna Angelidou*

Cyprus, and collate information regarding the ecosystem services provided by the different habitat types across the Akrotiri wetland. In addition, the fellowship has provided me with the opportunity to work with the Ministry of Education and teachers of the Akrotiri Environmental Education Centre to promote Poms-ký.

The opportunities resulting from this project will help towards coordinating conservation efforts through the ecosystem service assessment approach and contribute towards addressing current gaps of knowledge.

Ioanna Angelidou, MSc is a Darwin Plus Research Fellow based at the Joint Services Health Unit, British Forces Cyprus and the UK Centre of Ecology and Hydrology.

For more information on project DPLUS101, please click [here](#).



Martin Freeman installing seed trap with Nordenskjold glacier in background, Credit: Indigena field team

Newsletter Contacts

The Darwin Initiative Secretariat (Defra)

The Darwin Secretariat is based in Defra and includes Doug Gibbs, Scott Nelson and Chelsea Goodwin.

For any queries on project applications or existing projects please contact our Darwin Administrators (NIRAS-LTS International) at

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This newsletter is produced quarterly. To include an article on your project please contact us at

darwin-newsletter@ltsi.co.uk

The UK Government's Darwin Initiative aims to promote biodiversity conservation and sustainable use of resources around the world including the UK's Overseas Territories. Since 1992, the Darwin Initiative has committed over £177 million to 1,220 projects in 159 countries.