

## A Report: Darwin Feral Livestock Project

The new Darwin Initiative project entitled 'Reducing the impacts of feral livestock in and around the Centre Hills' and which started last July, issued its most recent update. It is adapted here, and presented for the information of our readers.

The aim of the project is to establish a sustainable long-term strategy to minimise the damaging impacts that feral livestock can cause in and around the Centre Hills. The project is being managed by the Department of Environment, who are collaborating with the Royal Society for the Protection of Birds (RSPB) an UK NGO and the Food and Environment Research Agency (FERA) an agency of the



British Government.

The Centre Hills have long been recognised as having critical value to the people of Montserrat in terms of providing a source of fresh water and offering protection from the Soufriere volcano, soil erosion, and floods. They are also recognised internationally for their rich biodiversity supporting critically endangered endemic species including the Montserrat Oriole, Montserrat Galliwasp and the Montserrat Orchid, and as a stunning environment which can be promoted for nature tourism. In the previous Darwin project the Total Economic Value of the Centre Hills to Montserrat was estimated to be around £1 million/year mainly through tourism and water. The conservation of the Centre Hills is therefore essential for the sustainable economic development of the island.

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increasing in number within the Centre Hills. The spread of pigs has reached Katy Hill, the most pristine and highly elevated environment within the protected area. The numbers of loose goats within the Centre Hills has also increased since livestock management moved to the North of the island.

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shown to cause devastating effects when they have invaded areas in which they are not native. Worldwide, countries such as Australia, America, New Zealand and Hawaii have

invested millions of dollars in applying methods designed to reduce feral livestock damage to protected areas. The increase of feral pigs in the Centre Hills is likely to lead to damage of native plants, including the Heliconia that the Oriole uses to build nests, predation of the Mountain Chicken and Galliwasp, polluted water catchments and increased soil erosion. Pigs may also damage crops, prey upon newborn lambs around the forest boundary and attack people hiking in the hills.

In its first phase, the project will aim to establish a baseline record of the number and distribution of feral livestock in the Centre Hills. To achieve this, we combine a series of techniques including monitoring signs of activity using the Department of Environment patrols, keeping a record of hunter activities, and noting activity around the water spring areas through collaboration with the Montserrat

when animals pass and trigger a sensor. These cameras have been used successfully in other parts of the world to monitor wildlife. We are also using feeders, called BOS 'Boar Operated Systems' that have been specially designed to attract pigs to bait so that we can better assess their numbers, age, sex and group composition. The BOS exploits the natural behaviour of pigs that often feed by rooting in the soil and has been designed so that no other non-target species can feed on the bait. The BOS was developed by the FERA a UK based scientific government agency and has been used in England and the USA, but this project on Montserrat represents its first deployment to the tropics.

The Department of Environment is working in close collaboration with the RSPB and FERA to ensure effective project delivery.



Stakeholders in the project include the Montserrat National Trust, the Department of Agriculture, landowners, hunters and Montserrat Utilities Limited - Water Division. A new project coordinator Mr. Richard Bunting, a citizen of the UK, was appointed in August and arrived in September to carry the project forward and liaise between all the projects stakeholders and partners. He will be working on the project until September 2010 when he will pass it on to local

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One of the biggest threats to the Centre Hills highlighted in the previous Darwin project is posed by feral livestock. Feral pigs mainly originating from abandoned livestock in the Exclusion Zone are thought to be dramatically increasing in number within the Centre Hills. The spread of pigs has reached Katy Hill, the most pristine and highly elevated environment within the protected area. The numbers of loose goats within the Centre Hills has also risen since livestock management increased in the North of the island following evacuation from the South.

Feral livestock have been shown to cause devastating effects throughout the world when they have invaded areas in which they are not native. The increase of feral pigs in the Centre Hills is likely to lead to damage of native plants and animals including Montserrat's endemic species, disruption of the forest, and the spread of exotic invasive species. It may also lead to increased soil erosion, agricultural damage, pollution of water and attacks on walkers.

Currently, the project is monitoring throughout the Centre Hills to establish the spread and density of the populations, mainly using state of the art infra red animal detection cameras. To compliment this we are also monitoring loose livestock and conducting a public

survey on attitudes towards loose livestock and meat consumption. Stakeholders in the project include the Montserrat National Trust, the Department of Agriculture, landowners, hunters, the police and Montserrat Utilities Limited's Water Division. The Governor's Office has also offered advice and support.

The long-term aim of the project will be to reduce the number of feral livestock in the Centre Hills. In February 2010, a workshop will bring together the project partners and stakeholders to decide the best course of action to mitigate the impact of feral livestock in this area. The Centre Hills are a national treasure of Montserrat and we must all work together to safeguard them for the future.



*Male pig rooting the ground within the forest boundary*



*The photographs are automatically triggered and use invisible infra red flash*



*Two male pigs, part of a larger group, observed near Corbett Spring*



# His Excellency the Governor's Christmas Message



They say a week is a long time in politics, yet a year flies by in Montserrat.

Some things don't change. The volcano started and ended the year glowing. The period of tranquillity between the two episodes seems like a cruel memory. My sympathy and thoughts are with all of you who have had to leave your homes. And, while nature can be cruel, it can also be kind. A bad year for storm chasers is a good year for us and our neighbours.

While the mountain was tranquil, we had the political fireworks of the election. Those three months seemed like an eternity, but it was time well spent. It was a robust and sometimes bruising battle. But most importantly it was peaceful and you confounded the sceptics by turning out in force to elect a government with a resounding mandate. You spoke clearly: no one is in any doubt that you demanded good and stable government and showed that you know both are critical for the accelerated development of the island.

In a year when the world faced up to the reality that the credit crunch was the economic equivalent of 9/11, Montserrat was relatively sheltered. Money is tight but good things happened and are happening. Some of them have been a long time in coming and have started to reshape the future.

Looking north and forward we can see the progress that has been made in Little Bay. Compare it to just a year ago. Tar is being laid and work is continuing



H.E. the Governor & Mrs Waterworth

as the outline of the town takes shape before our eyes. And the barge is gone. Next year buildings will start to rise and work on the harbour begins. I am sure that a photograph taken next Christmas will look as out of date as one taken a year ago does today.

And Little Bay is not alone. New buildings are rising across the island. Today, many of you will go to magnificent new churches that did not exist a year ago, others will spend their first Christmas in a new home and more of our mentally challenged friends can look forward to a safe and secure future in decent accommodation that did not exist only months ago.

We are also safer and more secure because of changes in the way we do things. We now have scheduled air and sea access and finally competition between airlines. For when things go wrong, there is an air ambulance and an

(Cont'd on pg 3)



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## Today's Scripture

Just as one man's trespass led to condemnation for all, so one man's act of righteousness leads to justification and life for all.  
-Romans 5:18

# Attacking Feral animals and loose livestock

Feral livestock and other animals, agoutis, guanas, etc. Received mention at the Sustainable Development Plan discussions held last week Thursday. The Montserrat Reporter was not aware of this workshop, but the Department of Environment shared a press release on the workshop. Here are some excerpts adapted as necessary, from that release on the



## Tackling the problem feral livestock on Montserrat

Invasive species have had a devastating impact on island biodiversity around the world and are one of the main drivers of species extinction on islands. In the Caribbean, pigs and feral grazing animals such as goats, sheep and cattle pose a severe threat to island environments of which Montserrat is one such island. Feral livestock numbers have risen sharply since the volcanic eruptions of 1996/97 which destroyed an estimated 60% of Montserrat's natural forest cover. This is due in part to the release of livestock following the evacuation of the southern part of the island, along with the common practice of keeping loose livestock from which many animals are recruited annually to feral populations.

The Centre Hills, a designated IBA, contains the majority of Montserrat's remaining forest and is the last viable enclave for the Critically Endangered Montserrat Oriole *Icterus oberi* as well as several other restricted range species of the Lesser Antillean EBA, including the Vulnerable Forest Thrush *Turdus lherminieri*. In addition they are home to a host of other endemic and threatened species, including the world's second largest frog the mountain chicken *Leptodactylus fallax* (CR) and Montserrat galliwasp *Diploglossus montisserrati* (CR).



Montserrat Oriole male (Peter Morgan)

Previous projects have identified the threat posed by feral livestock to Montserrat's natural environment and in particular the Centre Hills. In an ecosystem that has evolved in the absence of mammalian herbivores large numbers of goats, sheep and cattle predate many native plants, reduce forest regeneration rates and exacerbate soil erosion on the mountainous terrain. This includes destruction of the native *Heliconia caribea* which is the preferred nesting plant for the Montserrat Oriole. Pigs are especially destructive in rooting up vegetation and predated on many native species including endangered sea turtle eggs and hatchlings. In addition, an increasing feral livestock population is expected to have socio-economic impacts, for example

through the transmission of livestock diseases; to pose a threat to people from attacks and traffic collisions; and to contribute to pollution of watercourses.



Pigs rooting up turtle nests on Rendezvous beach (DOE, Montserrat)

Since July 2009 the Government of Montserrat has been assessing feral livestock activity in and around the Centre Hills by means of a network of infra-red game cameras. These have identified areas of high activity in order to guide a management strategy incorporating both control using locally trained hunters and improved livestock rearing, tagging and registration schemes. The camera network is currently being used to assess the effectiveness of these measures. A final project workshop in March 2010 aims to finalise a plan for the management of feral livestock, not only for Montserrat but for the Caribbean region as a whole.

The project entitled 'Reducing the impact of feral livestock in and around the Centre Hills' is supported by the UK Government and funded through the Darwin Initiative.

# DEPARTMENT OF ENVIRONMENT

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3<sup>th</sup> March 2009



## PRESS RELEASE – DARWIN FERAL LIVESTOCK PROJECT WORKSHOP

A variety of stakeholders led by the Department of Environment within the Ministry of Agriculture, Land, Housing & the Environment met at a workshop 22 to 24 February 2010 to develop an action plan for the management of feral livestock in and around the Centre Hills.

The purpose of the workshop was to develop a long term sustainable strategy to ensure that the biodiversity value, economic and social value, and overall integrity of the Centre Hills are not degraded by populations of feral livestock.

The workshop formed part of the ongoing Darwin Initiative project entitled: *Reducing the impacts of feral livestock in and around the Centre Hills*. Twenty-five persons attended including personnel from the Departments of Agriculture and Environment, the Montserrat Tourist Board, the Montserrat National Trust, Montserrat Animal Protection Society, hunters, landowners, livestock owners, the Antiguan Environmental Awareness Group, the Royal Society for the Protection of Birds (RSPB) and the UK Food and Environment Research Agency (FERA). The workshop was lively with participants showing enthusiasm for sustainable livelihoods and the environment, and a commitment to resolve the feral livestock issue.

During the opening ceremony, Mr Gerard Gray, Director of Environment outlined the feral livestock problem and the need for broad-based collaboration in its management. Supporting words were received from the Hon Easton Taylor-Farrell, Minister of Agriculture, Land Housing and the Environment. Mr James Millett of the RSPB addressed the group outlining the importance of the workshop to develop a sustainable action plan, which can be used to protect the Centre Hills from feral livestock.

The first day of the workshop focussed on feral livestock in the Centre Hills. Participants heard from Dr Sugoto Roy (invasive species specialist) and Dr Giovanna Massei (wild pig expert) both of FERA, on the damage that feral livestock do around the world and of their capacity to reproduce and spread. Mr Richard Bunting, Project Coordinator from the Department of Environment then presented the project data observed using monitoring cameras. The data confirmed that whilst feral livestock are found within the forest boundary, populations of feral livestock remain highest in the Exclusion Zone. Participants discussed the findings and added their own experiences of the problem.

After agreeing that the feral livestock situation requires attention the participants heard about potential control options from Dr Massei. There were many different lethal and non-lethal control methods proposed and each was presented in terms of effectiveness, cost, humaneness and practicality. After in-depth discussion it became clear that many of the presented control options were either not appropriate or not feasible for Montserrat. However, two options of lethal control: hunting with firearms and dogs, and trapping including the trial of corral traps, pit fall traps and decoy animals were selected for inclusion into the management plan.

Day two focussed on loose livestock around the Centre Hills as these animals can also stray into the forest and join feral populations. Mr Bunting presented project data on crop damage, the animal pound records and loose livestock surveys. Dr Selvyn Maloney of the Department of Agriculture delivered a very thorough summary of the pertinent livestock laws and spoke about the current and planned activities of the Department to address the problem.

Several points to be included in the action plan arose during debate amongst participants. These included implementation of the demonstration farm units to display improved animal husbandry techniques, support for the loose livestock tagging scheme, and improved enforcement of existing legislation through training and public awareness. Mr Millett reported on the results from the public opinion survey conducted in December and January. The results indicated that 80% of people questioned identified loose livestock as a problem on Montserrat. Interestingly, 85% of people polled felt that livestock owners are primarily responsible for improving the situation, with the Departments of Agriculture and Environment being identified as having a supporting role.

The workshop also considered the provision of local meat. The survey results indicated that the vast majority of people favour local meat because of its high quality. Dr Nicholas Waldron, Chief Veterinary Officer, gave a very interesting presentation entitled the veterinary considerations of slaughter and use of local meat. Participants felt, and the meeting concurred, that training in slaughtering techniques and meat hygiene should be offered to selected persons working on the project.

Dr Carmen Lake, a representative from the Antiguan Environmental Awareness Group, spoke about the loose livestock problem that Antigua faces and the communication strategy that they have used in order to raise awareness. There are perhaps more than 10,000 free roaming goats in Antigua. Overgrazing has led to accelerated soil erosion resulting in some areas becoming near desert. Participants were interested to learn of the



situation on the neighbouring island and some were shocked at the extent of the damage there. It was clear that Montserrat and Antigua face similar challenges in controlling the loose livestock problem.

The workshop produced a broadly-supported action plan for the control of loose livestock in and around the Centre Hills. Implementation of the plan will commence shortly. However, the feral livestock problem will not be solved in the short-term; it is an issue that will require management and the collaboration of key stakeholders for years to come. The plan will undergo periodic amendments based on lessons learned.

The Centre Hills are a national treasure given their global biodiversity importance and their social, economic and cultural value. Key stakeholders have recognized the importance of the Centre Hills and are collaborating to ensure that feral livestock do not degrade the area. The feral livestock action plan will be spearheaded by the Department of Environment.

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7<sup>th</sup> December 2009



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One of the biggest threats to the Centre Hills highlighted in the previous Darwin project is posed by feral livestock. Feral pigs mainly originating from abandoned livestock in the Exclusion Zone are thought to be dramatically increasing in number within the Centre Hills. The spread of pigs has reached Katy Hill, the most pristine and highly elevated environment within the protected area. The numbers of loose goats within the Centre Hills has also risen since livestock management increased in the North of the island following evacuation from the South.

Feral livestock have been shown to cause devastating effects throughout the world when they have invaded areas in which they are not native. The increase of feral pigs in the Centre Hills is likely to lead to damage of native plants and animals including Montserrat’s endemic species, disruption of the forest, and the spread of exotic invasive species. It may also lead to increased soil erosion, agricultural damage, pollution of water and attacks on walkers.

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Stakeholders in the project include the Montserrat National trust, the Department of Agriculture, landowners, hunters, the police and Montserrat Utilities Limited – Water Division. The Governor’s Office has also offered advice and support.

The long-term aim of the project will be to reduce the number of feral livestock in the Centre Hills. In February 2010, a workshop will bring together the project partners and stakeholders to decide the best course of action to mitigate the impact of feral livestock in this area. The Centre Hills are a national treasure of Montserrat and we must all work together to safeguard them for the future.

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In its first phase, the project will aim to establish a baseline record of the number and distribution of feral livestock in the Centre Hills. To achieve this, we combine a series of techniques including monitoring signs of activity using the Department of Environment patrols, keeping a record of hunter activities, and noting activity around the water spring areas through collaboration with the Montserrat Utilities Limited, Water Division. In addition, the project uses state of the art infra red animal detection cameras that are positioned in the forest and take pictures and video when animals pass and trigger a sensor. These cameras have been used successfully in other parts of the world to monitor wildlife. We are also using feeders, called BOS 'Boar Operated Systems' that have been specially designed to attract pigs to bait so that we can better assess their numbers, age, sex and group composition. The BOS exploits the natural behaviour of pigs that often feed by rooting in the soil and has been designed so that no other non-target species can feed on the bait. The BOS was developed by the FERA a UK based scientific government agency and has been used in England and the USA, but this project on Montserrat represents its first deployment to the tropics.

The Department of Environment is working in close collaboration with the RSPB and FERA to ensure effective project delivery. Stakeholders in the project include the Montserrat National Trust, the Department of Agriculture, landowners, hunters and Montserrat Utilities Limited – Water Division. A new project coordinator Mr. Richard Bunting, a citizen of the UK, was appointed in August and arrived in September to carry the project forward and liaise between all the projects stakeholders and partners. He will be working on the project until September 2010 when he will pass it on to local coordination.

The long term aim of the project will be to reduce the number of feral livestock in the Centre Hills but the strategy used to achieve this will be discussed during the second phase of the project, at a stakeholder workshop. In February 2010, the workshop will bring together the project partners and stakeholders to decide the best course of action to mitigate the impact of feral livestock in this area. The Centre Hills are a national treasure of Montserrat and we must all work together to safeguard them for the future.

# DARWIN NEWS

Issue 15  
August 2009

Newsletter of the UK Darwin Initiative



Promoting biodiversity conservation and the sustainable use of resources • <http://darwin.defra.gov.uk>

Welcome to the summer issue of the Darwin newsletter. The 10th of July saw the call go out for the next round of the Darwin funding and as you will notice there is an increased emphasis on the UK's overseas territories. The Wildlife Minister, Huw Irranca-Davies, announced the funding in early June saying 'I am very pleased to announce that, when I bring forward the new round of Darwin funding, I shall also announce that Round 17 will see potentially over one-and-a-half million pounds being earmarked for Darwin Projects in the Overseas Territories. Please visit the Darwin website (<http://darwin.defra.gov.uk>) for full details about the call.

Since April we have seen the successful start up of many new Darwin projects with 25 new scoping awards and 4 fellowships announced since our last issue. Also since our last issue we hosted the New Project Leaders workshop in London on May 21st. Many thanks to those who provided feedback on the event as we wish, as much as possible, to ensure that these events are fully tailored to the needs of those attending. Proceedings of this workshop are now on the Darwin website <http://darwin.defra.gov.uk/workshop/>.

A new briefing note has been

launched in the last quarter looking at the evolution of the Darwin Initiative in celebration of our namesake, Charles Darwin. Using the same concept for this newsletter we will be looking at the evolving practices of conservation and how these can often require us to approach biodiversity conservation in new and innovative ways.

Many of you will also be aware that May saw the call go out for new Darwin Advisory Committee members. The Darwin Initiative is looking for up to 6 new members for the Darwin Advisory Committee which advises the Secretary of State for Environment, Food and Rural Affairs on the principles and aims of the Darwin Initiative Grant programme and on the selection of projects for funding. The closing date for this announcement was 22nd June so we will keep you informed as and when new members of the Committee are announced.

Helen Beech has moved on to pursue a career in Art Therapy so the financial administration of Darwin projects been transferred to Ruth Palmer...more on Ruth in the next issue of the newsletter. Stephanie Godliman has now taken over the role in the Darwin Secretariat previously covered by Sarah Nelson....see article on p9 for more



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Full contact details for the Darwin Secretariat and the Darwin Initiative Programme are available on the Darwin website (<http://darwin.defra.gov.uk>)

people, as well as ensuring the financial sustainability of the protected area. Local communities also represent the best chance for genuine conservation of key species within the region – they know the species, the area and their own poverty alleviation needs. Giving communities and local staff the skills to collect and analyse their own conservation data without having to rely on outside expertise is a way of allowing the development of their own unique wildlife monitoring and management systems and sustaining their own habitat for the future.

Lean Kha, a 48-year-old ranger working for WWF Cambodia, was a poacher in the 70s. “As a 13-year-old boy I was forced by the Khmer Rouge to go into the forest and kill wild animals,” Kha said. “I quickly learned to shoot and lay snares. During a period of 5-6 years I shot 16 elephants, 14 leopards and two tigers. At the time, I was ignorant and did not think of the consequences when I shot those tigers. Today I’m really proud to work for WWF, and to use my skills to combat wildlife crime so that there will still be tigers and other wildlife in the forest when my children grow up.”

## Reducing the impact of feral livestock in and around the Centre Hills, Montserrat

Project ref: EIDPO027  
Sarah Sanders  
RSPB

On July 28th, 2009 Montserrat will issue a set of stamps to celebrate the 200th birthday of Charles Darwin and the Darwin Centre Hills project.

The original Darwin Initiative project (14-027) was successful in assisting Montserrat to establish a management framework for the long-term conservation of the Centre Hills. Building on this success, the Royal Society for the Protection of Birds in partnership with the Food Environment and Research Agency, the Montserrat Department of Environment (DoE) and the Department of Agriculture (DOA) are implementing a post project to establish a sustainable, locally managed programme to minimise the destructive impacts of feral livestock in the Centre Hills.

After the volcanic eruptions in the early ‘90s, the number of loose goats making incursions into the Centre Hills has risen as livestock management has moved to the North of the island. Feral pigs numbers have also increased dramatically, following the escape of domestic stock from abandoned agricultural areas in the South of the island.

Evidence from other islands shows that livestock

can have devastating impacts including: predation on globally threatened herpetofauna such as the Mountain Chicken, *Leptodactylus fallax*, and the Montserrat Galliwasp, *Dipoglossus montserrati*; destruction of native plants which have evolved in the absence of ungulates and are probably lacking chemical or structural defences against herbivores; dispersal of non-native, invasive plant species such as guava *Psidium guajava*; consumption of the native *Heliconia caribaea* plant, causing loss of Montserrat oriole nests and territories; potential attacks on people, impacting on tourism; damage to crops and infrastructures; pollution of water courses; damage to infrastructure such as the fencing of springs in the Centre Hills; prevention of forest regeneration and causing soil erosion.

Giovanna Massei-Smith at FERA



The current project aims to support the conservation of biodiversity and improve livelihoods by providing the people of Montserrat with tools to mitigate the impact of feral livestock in and around the

Centre Hills. Working closely with DOE and DOA staff and with a variety of local groups such as hunters, livestock farmers and the national GIS unit, the project will enhance local expertise and develop new skills to achieve the following:

- Undertake a baseline assessment of distribution and numbers of feral livestock in and around the Centre Hills. This will be carried out by estimating numbers of pigs and goats along transects, by attracting pigs to pig-specific bait stations called Boar Operated Systems or BOS, a system that has been trialled extensively in the UK to attract and count animals by remote surveillance, and by collecting data from hunters on number of pigs culled. From the latter, data on age and reproduction will also be collected to evaluate the potential population growth of this species. Gut content analysis will be used to identify key components of the pig diet;

- Evaluate options to mitigate human-livestock conflicts in the area. For the feral pigs these will range from total eradication to control methods such as trapping and culling. For the goats mitigation methods will include containment such as fencing and tethering and culling inside the Centre Hills. These options will be discussed during a workshop with stakeholders that will result in a feral livestock action plan;
- Implement the feral livestock action plan so pigs and goats within the Centre Hills are reduced to zero or contained at low numbers and monitor its effects;
- Review and strengthen existing livestock policy;
- Work with the media to raise awareness on Montserrat and in the Caribbean about the impacts of feral livestock on biodiversity and livelihoods.

Giovanna Massei-Smith at FERA



## Information for Authors

Darwin News is published quarterly. Suggestions for articles can be submitted any time. In the first instance only titles should be sent. Articles will then be commissioned for specific issues.

If you would like to publicise any events such as workshops, you can also submit this information and it will be posted on the Darwin newsletter information page.

To complete a short questionnaire providing feedback on our support to your project in the last year please follow this link -[http://www.surveymonkey.com/s.aspx?sm=JqES9ZXVDmvme7tIUNMuFg\\_3d\\_3d](http://www.surveymonkey.com/s.aspx?sm=JqES9ZXVDmvme7tIUNMuFg_3d_3d)



Regulation, Research, Response

# solutions 1



## The Secretary of State

Hilary Benn launches Fera  
15th June 2009

[Fera IN FOCUS]

- Keeping bees healthy
- Understanding uncertainty
- Spatial impacts of land use change

## School's out – looking for plant diseases

Gatsby Plants Summer School welcomed a team from Fera when the scientists ran their own specially developed practical plant pathology workshop. The Gatsby Charitable Foundation funds plant science research in the UK, and Gatsby Plants has been established as a national teaching facility for plant sciences.

The annual summer school brings together high-achieving first year UK university undergraduates with leaders in the field of plant science research. The Fera practical was led by scientists Dr. Charles Lane and Dr. Paul Beales, with technical tutor Kat Webb and practical tutors Drs. Kelvin Hughes (Fera), Tim O'Neill (ADAS) and Matthew Dickinson (University of Nottingham).

As well as dealing with the general health implications of invasive plant pathogens, the workshop drew on Fera's extensive work with *Phytophthora ramorum* (sudden oak death). "It was the first time many of the students had done any practical plant pathology, and we gave them a mixture of lab and field-based work, inspection and diagnosis," said Charles.



Students at Gatsby Summer School check for signs of plant disease.

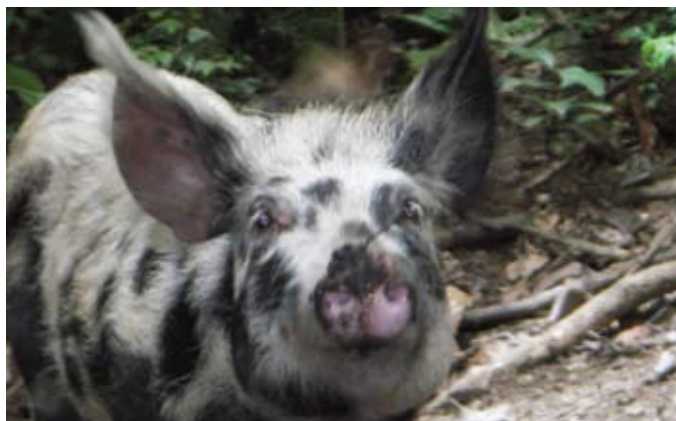
## Can't believe it's not chicken?

Using cutting edge technology, found at the very edge of medical and academic research, Fera has been working in conjunction with York University to develop a new technique to investigate the authenticity of chicken. On behalf of the Food Standards Agency (FSA) the laboratory has carried out studies on the amino acid sequences of the proteins in the meat. The method can identify the species of any protein added to the meat, important because where protein from other animal species is added, this species must be clearly marked on the label. These proteins are often added in 'injection' or 'tumbling' mixtures used to help retain water in chicken breast products.

Analysis of both commercial injection powders and catering packs of chicken fillets has indicated that proteins from beef or pork gelatine were also present in some of the samples. Use of these proteins does not make chicken products unsafe, but it is important that people are given accurate information about their food.

The new protein sequencing techniques will form a support service to food industry quality control teams. For further information contact:

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Feral pigs are a potential problem in Montserrat

## State of the art mass spectrometry

Fera's metabolomics programme strengthened its capabilities in the area of climate research initiatives through the installation of a Thermo Fisher Scientific Exactive™ mass spectrometer, at the Sand Hutton site. In addition to strengthening this area of Fera's work, the 'seed' instrument will benefit both Fera and Thermo Fisher Scientific in the development of novel techniques for non-targeted identification of contaminants in food matrices.



Thermo Fisher Scientific Exactive™ in use at Fera

## Latest NMR techniques

Fera has recently completed the renovation of its Nuclear Magnetic Resonance (NMR) suite at Sand Hutton. The work included the installation of a new 500 MHz NMR instrument to complement its existing cryoprobe NMR facilities. The move will allow the very latest NMR techniques to be utilised in its ongoing programme of public and private sector research.

## Reducing the impact of feral livestock in and around the Centre Hills, Montserrat

Fera is working in partnership with the Royal Society for the Protection of Birds (RSPB), the Montserrat Department of Environment (DOE) and the Department of Agriculture (DOA), to implement a project that will establish a sustainable, locally managed programme to minimise the destructive impacts of feral livestock in the Centre Hills area of Montserrat.

After recent volcanic eruptions the local number of loose goats and pigs has risen following the escape of domestic stock from abandoned agricultural areas. Feral livestock may have devastating impacts which include predation on globally threatened species, destruction of native plants and dispersal of non-native invasive plant species. There is also the potential for attacks on people, damage to crops and infrastructures, pollution of water-courses, prevention of forest regeneration, and soil erosion.

Working closely with DOE and DOA and with local groups such as hunters, livestock farmers and the National Geographic Information System unit, the project will evaluate options to mitigate human-livestock conflicts in the area, to enhance local expertise and to develop new skills. The project will review and strengthen existing livestock policy, and work with the media to raise awareness on Montserrat and in the Caribbean about the impacts of feral livestock on biodiversity and livelihoods.

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# Montserrat Centre Hills Management Plan: an example of planning and implementing protected areas at a site scale

Stephen Mendes (Montserrat Department of Environment)



Mendes, S. 2010. Montserrat Centre Hills Management Plan: an example of planning and implementing protected areas at a site scale. pp 221-225 in *Making the Right Connections: a conference on conservation in UK Overseas Territories, Crown Dependencies and other small island communities, Grand Cayman 30th May to 5th June 2009* (ed. by M. Pienkowski, O. Cheesman, C. Quick & A. Pienkowski). UK Overseas Territories Conservation Forum, [www.ukotcf.org](http://www.ukotcf.org)

Montserrat is currently subjected to volcanic activity which has restricted use of two thirds of the island. In the remaining third, the forested highlands make up about 27% of the inhabited area. They are of particular importance in providing communities with a wide variety of useful goods and services, including the only water source. The forest suffers from human-related pressures, such as agricultural encroachment, unregulated hunting, and limited enforcement of wildlife and environmental legislation due to capacity constraints, increasing pressure for infrastructural development and the increasing prevalence of invasive species.

Increased efforts have now been made, building on recommendations made since 2000, to ensure that the remaining forests and their wildlife are maintained and protected. A spatial planning exercise was carried out 1998 to address the future needs of the island. This exercise earmarked areas for conservation, including the Centre Hills.

In 2005, a Defra Darwin Initiative-funded project was launched. Supported by numerous local and international partners, it planned for the creation of a National Park. As part of the process, the local community was engaged through extensive outreach, and legislative frameworks were reviewed. An economic valuation of the area in question was also conducted; preliminary findings are demonstrating that the benefits of a management system, which can enhance and sustain the forest value, far outweigh the costs.

Despite the many challenges faced, especially compounded by the global economic crisis, a comprehensive management plan has been created for the Centre Hills, largely informed through the efforts of spatial data collection. It is sincerely hoped that, with increased capacity, this plan can be implemented and that it will serve as a blueprint for management of other biologically diverse areas on island and across the Caribbean.

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Montserrat, a quaint little island of 102 km<sup>2</sup>, is located in the Leeward archipelago of islands, 16° 45' N 61° 10' W, 27 miles (44 km) south west of Antigua. It is one of the founding Members of CARICOM and the sub-regional Organisation of Eastern Caribbean States (OECS).

Currently, the biodiversity of the island is under the stewardship of the Department of Environment,

formed in late 2006. The Department is yet to have a full compliment of staff to carry out its mandate. An NGO, the Montserrat National Trust, also has responsibility to ensure that the island's heritage, both natural and built, is preserved for future generations. It too is in need of enhanced capacity.

The natural environment of Montserrat has been wrought over the years by habitat destruction.



Since the seventeenth century, at least 30% of the lowlands were totally cleared for colonial sugar production. By 1670, the island's ecosystems came under increasing pressure as a law was passed that contributed to the drastic destruction of forest cover. It stipulated that "all owned land be cleared every year as a condition, confirming continued ownership." Unfortunately, the colonial Governors of the time also clung to myths that the forests exuded harmful vapours which caused "fevers and agues". Thus the slaves of the day were ordered to chop the forests down.

An initial attempt to curb the unchecked damage came in 1702, when a law was passed to protect all



### Volcanic Ash , debris and acid rain



ghauts (streams/rivers) on the island. This encouraged the prolific planting of fruit trees that still remains a tradition today. Most ghauts are filled with breadfruit, mangos, mammie apple and hogplums.

Since the mid-1990s, the ongoing volcanic eruption has effectively wiped out at least 60% of the island's natural vegetation, and impacted marine fauna and flora with ash deposition. Of the 39.5 square miles of land, only 14 square miles can now be occupied by the human population.

The Centre Hills remain the last forested area of the island and occupy approximately 27% of the usable land.

Following the start of volcanic activity, planners realized that they would have to mobilize quickly to ensure that development on the northern third of the island could be expedited. The Centre Hills, though home to species of global importance, and providing the prime watershed for the entire island, was becoming subject to many pressures:

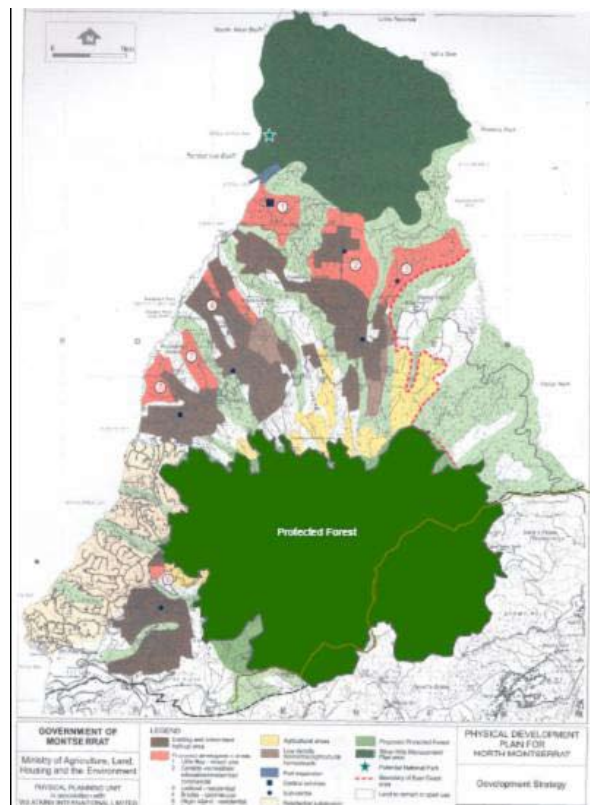
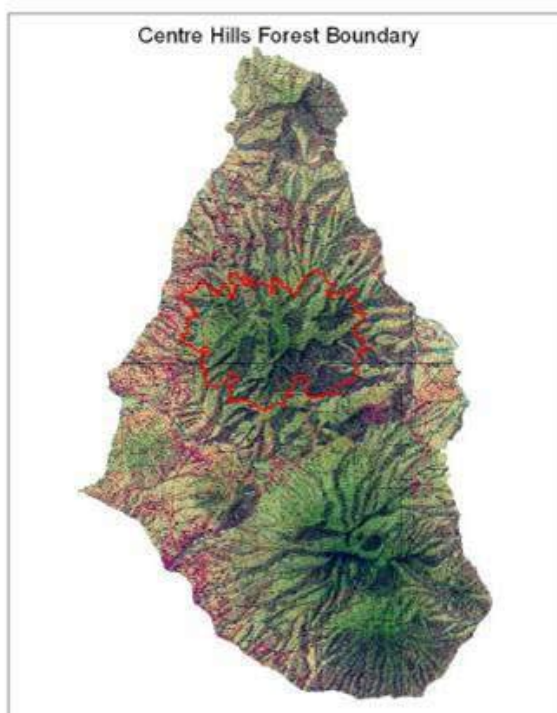
1. Volcanic ash, debris and acid rain





2. Development pressure: land for agriculture, pasture, road infrastructure, and housing
3. A growing number of invasive species that could impact on biodiversity. Many of the problems resulted from the departure of farmers who had to abandon their livestock as a result of the eruption. Such animals include goats, sheep, cattle and pigs.

Early attempts at conservation included the proposed protection of all lands over 1500 feet (500 m) in elevation, although laws have not been made to implement this. However, the Forestry Act of 1956 gave some measure of management and protection. Specifically more targeted to the Centre Hills, the Wildlife and Protected Areas Act of 1996 was passed; this demarcated the Centre Hills Forest boundary as we know it today. This measure of protection was complemented by the Physical



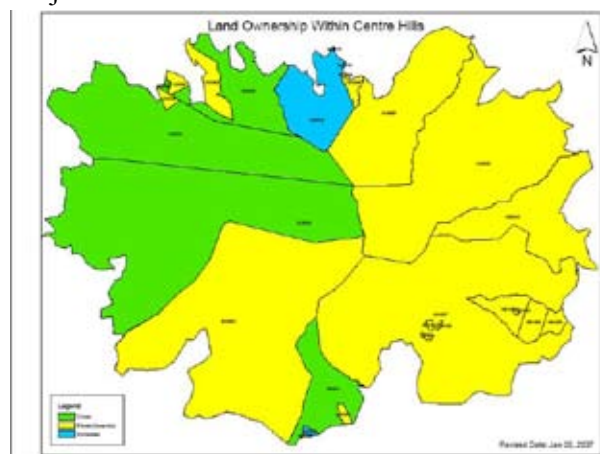
*Physical Development plan for the north of Montserrat*

Development Plan 1998-2008, which suggested the designation of the area as a protected forest.

Officials from the Physical Planning Unit were quoted as saying;

- “Montserrat is a small island and it is essential that we have a balance between the natural and the built environment.
- “Centre Hills is critical to the Island’s development, based on what it contributes (watershed, biodiversity, mitigation for soil erosion, storm protection).
- “Planning needs to be organised so that the built environment can co-exist with the natural one.”

Through a Darwin Initiative grant, the Centre Hills Project came into existence in mid-2005. This



3-year project was intended to enable the people of Montserrat to conserve the Centre Hills. The project included:

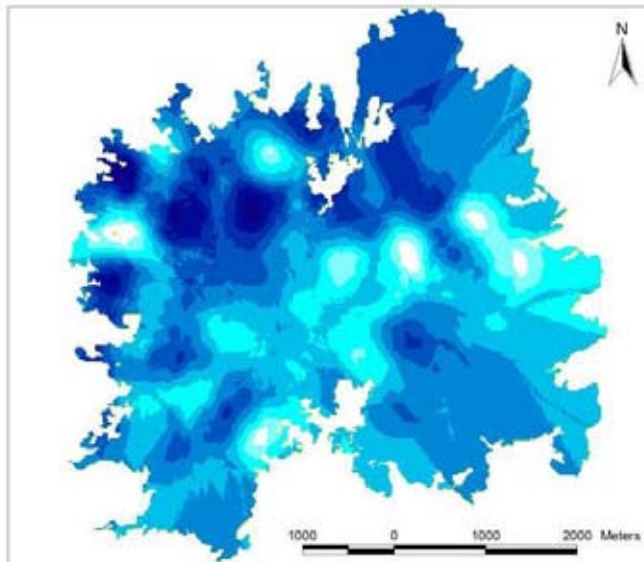
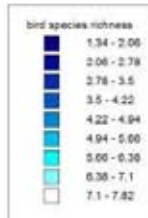
- In-depth biodiversity assessment within the forest boundary. This included the creation of numerous biodiversity assessment points throughout the forest, and recorded data for birds, bats, insects, plants, amphibians and reptiles. A report was compiled and is available on the Durrell website ([www.durrell.org/library/Document/Durrell\\_Cons\\_Monograph\\_1\\_Full\\_Report.pdf](http://www.durrell.org/library/Document/Durrell_Cons_Monograph_1_Full_Report.pdf)).
- An economic valuation of the area. This was a pilot study in order to introduce techniques in valuing the ecosystem services of the Centre Hills. It was thought that placing a monetary value on these services, would make it easier for the person on the street to better appreciate the value of biodiversity. It is also a good tool to persuade decision-makers. The study highlighted also the need for additional data to be collected in order to get optimal results.
- Awareness raising, so that the general public would better appreciate the values of the natural area.

As the project progressed, it was realized that there would be a need to review current legislation, to take into account, the project findings, to meet multilateral agreement requirements, and to provide a legal framework for the Department of Environment. This legislation is still under review.

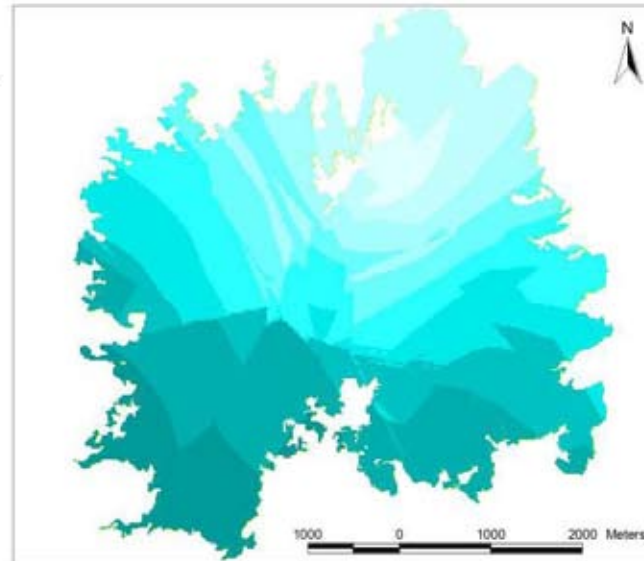
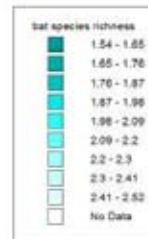
### The Management Plan

The costs of full implementation of this Plan, developed by the project, is estimated (including staff costs) at US\$ 900,000 per annum.

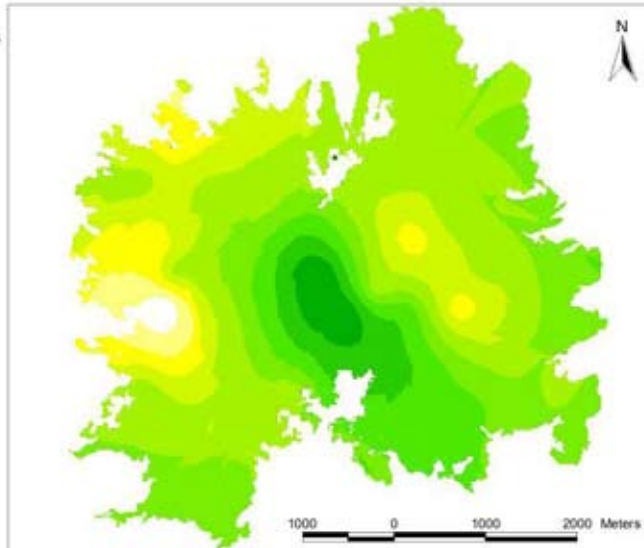
Bird species richness in Centre Hills  
Interpolated by kriging using a linear with sill model and a 450 m search distance



Bat species richness in Centre Hills  
Interpolated by kriging using a circular model and a 2 km search distance



Herpetile species richness in Centre Hills  
Interpolated by kriging using a circular model and a 2 km search distance



The Plan's aims are to:

- Promote sustainable livelihoods of resource users in and around the Centre Hills
- Conserve biodiversity, habitats, and ecosystem

