

Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities

Gibraltar
11th to 15th July 2015

Proceedings

edited by Mike Pienkowski & Catherine Wensink
with Sarah Barnsley, Emma Cary & Ann Pienkowski

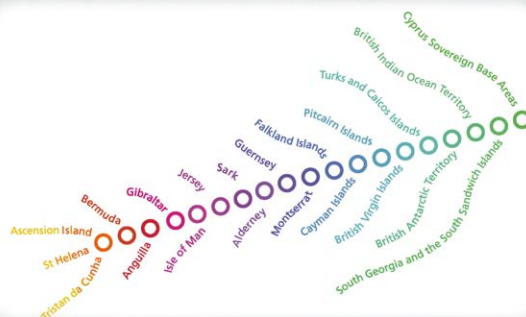
and published by

UK Overseas Territories Conservation Forum

Conference organised by:

HM Government of Gibraltar's Department of the Environment
and Climate Change, and

UK Overseas Territories Conservation Forum, with the support of
Gibraltar Ornithological & Natural History Society



Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th June 2015

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Published by UK Overseas Territories Conservation Forum (www.ukotcf.org)

First edition - December 2015 ISBN 978-1-911097-02-0

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In addition to the prime resourcing by HM Government of Gibraltar and UKOTCF, we acknowledge the support from Defra for some of the preparatory work in the previous years, JNCC for support for some of the participating UKOT governmental participants, and Treweek Environmental Consultants for the EIA workshop.

Front & back cover main picture: The Rock emerging from the morning mist. Photo: Mike Pienkowski



Conference participants Photo: Juan Carlos Teuma, Gibraltar Government Press Office

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Editors' Introduction

In these proceedings, we try to capture as much as possible of the valuable information brought together at the conference, both as an *aide memoire* for those present and to make it available to those who were not.

In this first section, we include first the conclusions and recommendations resulting from the conference. These bring together in a structured way many of the discussions from the various sessions, as well as preparatory discussions by widely drawn teams donating time in advance and consultations involving conference participants after the conference. In Appendix 4, these are presented in an alternative form, divided between the target audiences.

Our first section continues by setting the scene in a wider context, including that of policy-making. It comprises the opening speeches, both at the opening event in the Garrison Library and at the start of the first full conference session. These are followed by the keynote lecture by our host, Hon. Dr John Cortes, Minister of Health, Environment and Climate Change in HM Government of Gibraltar. As well as introducing us to Gibraltar, this lecture reviewed progress, especially since the previous UKOTCF conference here in 2000, as well as some current issues.

The following sections then address each session of the conference, combining in one place any sessions split in time. Posters are incorporated in the appropriate section where there is one. Other posters are brought together and placed in the sequence at the time of the main poster session (although posters were on display throughout the conference).

For each paper (whether based on a talk or a poster) for which the information was available, we have included an abstract and a main text, supported by illustrations where appropriate and available. In a few cases, lack of availability prevented inclusion of some items. For some items, such as Minister's speeches, we have adopted a simpler format. In some cases, explanatory notes not in the authors' words need to be added; these are generally in italics where this aids clarity.

A large part of each session was deliberately devoted to discussions, to facilitate taking issues forward in an integrated way. Most of these discussions are incorporated in the section on Conclusions and Recommendations. In some cases, notes of discussions are included in the

section documents, especially where these address additional points. The meetings of UKOTCF's regional working groups are reported separately in their usual series of records, and also contributed to the Conclusions and Recommendation. Therefore, full reports are not included in these Proceedings.

We include with this group of technical sessions, and slightly out of sequence, the post-conference workshop on Environmental Impact Assessment.

Then we turn to the closing speeches, either at the end of the final main session, after summaries of session recommendations, or at the Closing Conference Dinner. These speeches comprise, first, those by Ministers or other leaders from other UK Overseas Territories or Crown Dependencies who had attended all or part of the conference. Then, we have UKOTCF's thanks presented by the Forum's Chairman, Liz Charter, and host Ministers' closing speeches.

These are followed by the conference's Conclusions and Recommendations, compiled in a process (explained in the section) starting before the conference, running through it and ending in post-conference consultations with participants.

The Proceedings end with several Appendices, which include the final published programme, the list of participants, the feedback received from participants, and the alternative form of the Conclusion and Recommendations noted earlier.

A new innovation at this conference, and one which UKOTCF had worked hard with our HMGoG hosts to make happen, was the first meeting of Environment Ministers or equivalents of UK Overseas Territories and Crown Dependencies. This was held the day after the main conference (see Appendix 5).

Many people have helped in producing these proceedings. We will not repeat the thanks to all those involved in making the conference happen (see pages 447-448) – but we, of course, stress those. In the editing of the proceedings, we thank additionally all the authors of papers and posters and others supplying additional material. Our thanks for this are not reduced by the fact that we have to say that not all of these followed the instructions for submission of written versions and supporting illustrations! In order to overcome this and to record discussions, we are grateful for the help of Ann Pienkowski in transcribing recordings and processing images, and to Sarah Barnsley,

Emma Cary, Natasha Natasha Bull and Phoebe Carter for taking excellent notes.

Unless indicated otherwise, uncredited photographs of authors are by UKOTCF. Other uncredited photographs in articles were supplied by the authors. Uncredited photographs in the general sections are by the UKOTCF conference team (including Jamie Woodward, Piers Sangan, Ann & Mike Pienkowski, and Catherine Wensink). We are indebted for many photographs (including the conference participants) to Juan Carlos Teuma, from the Gibraltar Government Press Office. We are grateful also to the many other photographers who have made pictures available; these include Andrew Dobson, Mervin Hastings, Bryan Naqqi Manco, Boyd McCleary, and Chris Tydeman.

The conference outputs do not stop with the conference, as these proceedings and many other things show. In this context, we want to thank participants for letting us know about subsequent press articles, including those in Bermuda and Isle of Man and St Helena that we know were published. The BBC website carried an article resulting from the conference on St Helena invertebrates. BBC Radio 4's *Costing the Earth* series carried the programme largely recorded at the conference and based on the marine session. We try to recording outputs from the conference or made possible by it (for example, a work experience programme organised with Isabel Peters from St Helena and undertaken by her while in the British Isles before and after the conference). It is valuable, not least when trying to resource future conferences. Therefore, please keep us informed of further outputs or other consequences.

Although these conferences require a very great deal of work to be successful, we are cheered by the very positive response from participants (see Appendix 3) and we hope to find the resources to continue this series of conferences.

Mike Pienkowski and Catherine Wensink

Opening: Garrison Library

Speakers:

Deputy Chief Minister, The Hon. Dr Joseph Garcia
Minister for Health, the Environment, Energy and
Climate Change: The Hon Dr John Cortés MBE
MP CBiol CEnv

Dr Mike Pienkowski, Honorary Executive Director,
UKOTCF



Minister for Health, the Environment, Energy and Climate Change: The Hon. Dr John Cortés MBE MP CBiol CEnv



conference. So I'm not, other than this very brief welcome, going to say much now, but it gives me great pleasure to welcome and to introduce the Deputy Chief Minister of Gibraltar.

The journey that has brought me to where I am would not have been possible had I not been absolutely convinced that the Government that I was joining, or was going to join after the election, was totally committed to the environment.

Dr Joseph Garcia, who is the Deputy Chief Minister, is a great supporter of everything that I do and my department does. He chairs the Gibraltar Climate Change Task Force and is a great ally to have when one is trying to push the environmental dimension in everything that we do. So it gives me great pleasure to welcome you formally to Gibraltar, and to introduce my colleague, and my boss, the Deputy Chief Minister Dr Joseph Garcia.

Ladies and gentlemen, good evening. And hello to all the old friends I haven't yet bumped into. I'm waving at some of you now. It's really really great to see you here, really wonderful: at all sorts of different levels. The last time I saw some of you here, I certainly had no idea I was going to be doing the job I am doing now. So welcome back. I have no idea what I will be doing the next time you're here, but we'll just have to wait and see.

I'm going to be saying a few more words tomorrow at the opening of the formal part of the





Deputy Chief Minister, The Hon. Dr Joseph Garcia

Thank you, John, for that introduction. I think anybody who knows you will know that you have no bosses, other than the environment.

So welcome all of you, distinguished guests, to this conference “Sustaining Partnerships - a conference for conservation and Sustainability in UK’s Overseas Territories, Crown Dependencies and other island communities.”

It gives me pleasure also to welcome the Minister for Economic Development, Joe Bossano, who has just walked into the room. You will be able to talk to him later on this evening.

This, the conference, has been organised by the Department of the Environment and Climate Change of Gibraltar, by the UK Overseas Territories Conservation Forum, and with the support of the Gibraltar Ornithological and Natural History Society. It is an impressive line up, I mean looking through the programme for the conference, which John very kindly passed on to me. It is extremely impressive to see the level, the high level and the high quality of the guests, of the speakers and the list of participants, and certainly it is something which Gibraltar welcomes. We very much value our relationship with the other Overseas Territories. It is something we should cherish. We share many things in common, not just the links with the United Kingdom, but certainly the values and history and traditions. I think that is something which we all share. And we feel very much in Gibraltar that we are part of that wider Overseas Territories family.

And some of you are Crown Dependencies, and some of you are island communities with perhaps not that link with the United Kingdom, but certainly you are all very welcome here in Gibraltar; and I understand that 100 people are taking part in the conference. By our standards that is pretty huge! Gibraltar is a very small place. The population is about 32,000 people in the last census. So to have 100 people coming in is certainly helpful and a real boost to our tourist figures, and our hotel occupancy. Very useful!

I understand the first conference took place here in the year 2000 – indeed I have met some of you already who were here in 2000 for that conference – and the last one took place in Cayman in 2009.

I’d like to say something about what John mentioned, our commitments to the environment and the fact that was one of the reasons why he



stood for election with us. Certainly the reverse also applies. I think having John being our Minister for the Environment has been extremely helpful, extremely useful, and served as an education, certainly to people like me who did not know as much of the environment as we do now.

My own background, for example, is as an historian, and Joe is an economist, so it has been extremely useful to have John with us. I think it is reflected in the policies we have adopted as a government in many areas. There is now an environmental filter in place in relation to all the government policies.

Historically, the Department of the Environment was very much a self-contained department which ran its own show. Now I think it is fair to say that there is an environmental filter across Government policy, and across all Government Departments, and John has been instrumental in achieving that, and in putting it in place, together obviously with the fantastic team at the Department of Environment here in Gibraltar. You see that reflected for example in policies like renewable energy. This is something which you would have thought, with Gibraltar being in the Mediterranean and having so much sunshine, that this was

something that should have been developed much earlier, but it wasn't. And it's taken us to come into office, with John as the Minister for the Environment, to see, for example, solar thermal projects taking place. There are a couple of solar thermal projects now underway here in Gibraltar. They have been immensely successful – not just from the point of view of generating electricity in areas like a sports-hall and in areas like an indoor swimming pool, but also in resource-saving. This is a useful saving that Gibraltar has made, both economically and environmentally, as a result of that. So thank you, John.

Also in relation to power generation, for example, we are now considering moving from diesel to gas. Gas is a far cleaner source of energy, and again, that is something which we have progressed during this term of office.

But also in relation to our natural environment, one very obvious policy, which was listed in our manifesto and carried out very enthusiastically, is simply tree planting. The number of trees which are being planted all over Gibraltar under the Department for the Environment is extremely impressive

You will have seen, or some of you will get the opportunity to visit hopefully, during your stay here, Commonwealth Park. This is a green area in the centre of town, which used to be a dirty noisy car park but, within 3½ years, we've actually transformed that into an oasis in the centre of our city. And I hope some of you will go along there and visit. It is certainly worthwhile.

Also, in relation to the marine environment, and in relation to the Upper Rock, there are certain measures that we have taken which are there to strengthen and to protect the maritime and terrestrial heritage of the environment in these two areas. It is one thing to have legislation in place – and we have – and another thing is to enforce it. And we have done this. We have employed an

environmental enforcement team which is now out at sea and also up in the Upper Rock as well. So again we need to legislate but also we need to act at the same time to make sure that those rules are not broken.

I think, to round up, what I need to do is to first of all thank all of you, and to officially and, on behalf of the Government and people of Gibraltar, to welcome you to Gibraltar, to wish you success in your deliberations. I know the conference is being opened officially tomorrow by the Chief Minister together with John Cortes, so that will be the official opening. My role simply is to welcome you to Gibraltar and to wish you all the very best in your discussions. Thank you very much.

[Applause]

Dr John Cortes:

I'm acting as Master of Ceremonies but, before I hand over to Mike, I must comment that my friend and colleague Joe Bossano walked in just as Joseph Garcia was saying the words "distinguished guests".

I must say that Joe was Chief Minister of Gibraltar for 8 years from 1988, at a crucial time in the development of the environment in Gibraltar. It was under his Chief Ministership that the Nature Protection Act, which pioneered European environmental legislation, was passed, the Botanic Garden was founded and the Gibraltar Ornithological and Natural History Society was given premises from which it took off. Also, the first Minister for the Environment was during Joe's tenure. So I can very well tell you that none of us would be here, and none of what you see around would be the way it is, if it hadn't been for the years that Joe was Chief Minister. And I really need to say that in front of distinguished guests.

[Applause]





Dr Mike Pienkowski, Honorary Executive Director, UK Overseas Territories Conservation Forum

Honourable Deputy Chief Minister Dr Joseph Garcia, Hon Minister for Health, the Environment, Energy & Climate Change Dr John Cortes, Honorable Minister for Economic Development, Joe Bossano, Honourable Minister of Environment from Montserrat Claude Hogan, Chief Executives, Directors, specialists, workers, volunteers, colleagues and friends. and apologies to others whom this simple scientist may have inadvertently omitted.

On behalf of the Council, officers and whole network of UK Overseas Territories Conservation Forum, thank you to HM Government of Gibraltar for hosting this conference and providing the largest contribution of financial support. This is not, of course, in any way to underplay the support of UK's Dept of Environment, Food & Rural Affairs, Defra, in a previous financial year for the part of the early planning stages, and that of JNCC in contributing to the costs of some of the technical participants from some of the UK Overseas Territories government bodies. I want to thank also particularly Dr Jo Treweek, of Treweek Environment Consultants, for large donations of very highly qualified time in respect of EIA workshops – and indeed my colleagues in UKOTCF for absolutely huge amounts of donated time. Thank you all for coming, and to you and all your colleagues at home for all your preparatory efforts.

It is a real pleasure for me personally to be at the opening of this conference in Gibraltar. Apart from the oldest amongst us (and I am trying to avoid looking at anyone in particular), many participants may not know that this series of very productive conferences started in the late 1990s as a collaboration of HMGoG, UKOTCF and GONHS. Although this was not the first UKOT/CD conference to take place, it was the first to be organised. It was well planned over two years to take place as the Calpe 2000 conference “*Linking the Fragments of Paradise.*”

During the planning period, UKOTCF had helped Iain Orr, then of FCO (who is here today, now an escapee – sorry, retiree – from FCO – and a Council Member of UKOTCF), organise at short notice a conference in London called “*A Breath of Fresh Air.*”

The Calpe 2000 conference set the standard for



what turned into a series of working conferences for conservation practitioners in the UK Overseas Territories and Crown Dependencies. At all of these, we have had some involvement from overseas entities of France, the Netherlands and other nations, as well as small independent states. A colleague from the Dutch Caribbean had long been planning to be with us on this occasion, but an urgent local issue caused her to withdraw. We are very pleased to have participants from French overseas entities, as well as from St Lucia and larger nations with an involvement – including what I nearly described as the former UK overseas territory of the United States.

In total, when I last counted, we have 17 territories and the 4 home countries of the UK represented, as well as nine other countries.

The Gibraltar conference in 2000 was followed by Bermuda in 2003, Jersey in 2006 and Cayman in 2009. These have been very productive in, as one participant put it, making good things happen that otherwise wouldn't. I am not going to detail examples here, but these and feedback are analysed in the proceedings of earlier conferences. One of the most frequent questions we received

from territory partners in the long gap since the Cayman conference has been: when is the next UKOTCF conference? Well: here it is.

We had hoped to have a UK Minister at this conference but the short time interval since the relevant ministerial appointments following the UK General Election has prevented this, despite the valiant attempt by officials, whom we thank. The then Defra Minister of the Natural Environment, who participated throughout the Cayman conference, is now in opposition – I don't think that these two things are linked! By a happy coincidence, this former Minister, Huw Irranca-Davies MP has just been elected as the Chair of the House of Commons Environmental Audit Committee. UKOTCF has worked closely with this Committee in the past, and I know this Gibraltar administration has too. Mr Irranca-Davis has asked me to pass to the conference a message, and I am pleased to do this now:

Dear Mike

It was an honour to address the last UKOT environmental conference in 2009 and it was with regret that I had to decline the invitation to the upcoming conference. I appreciate your understanding of the requirements on my time at this important early stage of re-establishment of the committee.

I do hope that you will convey to the conference audience that I look forward to building the relationship with UKOTCF and helping the committee play its part in ensuring the overseas territories continue to be recognised as a crucial part of the UK's approach to biodiversity, environmental protection and sustainable development.

Great progress has been made, including the designation of a marine protected area around the Pitcairn Islands and the committee will be keen to keep an eye on progress here and towards a Blue Belt around the overseas territories, as well as other matters related to the conservation of UKOTs. On that basis I would be grateful if you could notify the committee team of topics arising from the conference which you believe will be of interest to the EAC, it will be most useful in developing the committee's future programme.

Kind regards,

Huw

[Applause]

We shall obviously respond after the conference to the Minister, based on the conference's discussions.

Throughout this series of conferences, we have tried not just to help progress environmental conservation and sustainable use, but also to learn from our experiences in running conferences ever more efficiently to make use of the generous support and all your valuable time.

I recall that, at the time of the *Calpe* conference, the then Director of the Gibraltar Botanic Garden and General Secretary of GONHS, as well as the lead local conference organiser, a certain Dr John Cortés, told me that he viewed organising that conference as the peak of his career. This was typically modest of John – as I see the voters of Gibraltar, and you Deputy Chief Minister, agreed – so that John has embarked on yet another career.

The primary objective of this conference remains in common with its predecessors: to exchange information and experience on best practice so that we can all be as effective as possible with our limited resources, and to develop joint approaches and projects where this is mutually advantageous. We know that Gibraltar and all territories have good examples – and experiences of addressing challenges – from which the others can benefit in progressing to a sustainable future.

Hence our title, developed around a table last year in the office of Hon Dr John Cortés, and with the approval too of the Hon Chief Minister: *Sustaining Partnerships*.

I thank you for your attention and look forward to the presentations and discussions over coming days.

[Applause]



Opening of conference first session

Hon Dr John Cortés, Minister for Health, Environment, Energy and Climate Change, H.M. Government of Gibraltar

It was unfortunate Her Majesty's Government of the United Kingdom was not able to send a representative to Gibraltar, for whatever reasons they may be – and when it comes to Gibraltar. But the message is what it is all about – and we will make absolutely sure that the conference, meetings of the Ministers on Thursday, and the Government of Gibraltar will listen to the results at the conference and make absolutely sure that the messages get through Her Majesty's Government in the United Kingdom.

I am really looking forward to the next few days. I have made gaps in my diary so that I can be here with you for a lot of the sessions or as many as possible. I am just going to say a bit about Gibraltar. Most is not within my comfort zone of the natural environment, but economics, which is certainly not in my comfort zone. I get on extremely well with the Minister for Economic Development, who was here yesterday evening at the opening ceremony. We differ in that he likes to make money and I like to spend the money that he makes!

Gibraltar's economy is astoundingly sound. This year, we had a budget surplus of £54m, which is tremendous for the size of Gibraltar. Following a £65m surplus last year, we allocated £10m to opening a University, because that is the sort of thing one does. The annual growth of the economy

is over 10% per annum and has been right the way through the economic crisis. Gibraltar is third in the world in GDP per capita. We are attracting investment. A few weeks ago, we announced an investment of £1.1 billion in a development on east side of the rock on existing reclaimed land, so no environmental impact to worry about. Despite economic growth, despite an unemployment of 190 which is almost zero unemployment, and we are just next to a community with 30-40% unemployment in Andalucía, despite all that, we are not negatively impacting the environment in any significant way. As Minister for the Environment, I have not had to lose much sleep over what we are doing in developing and in making the strides that we are making economically. I think that is something really significant.

During all this time that we have had this continuing economic growth, we, for example, increased the size of our protected areas. We have changed the Upper Rock Nature Reserve into the Gibraltar Nature Reserve, which now covers most of the non-urban area of Gibraltar. We have declared a Special Protection Area and a Special Area of Conservation, both under EU law, on the Upper Rock. We have legislated marine protection and introduced marine protection regulations on the 1st of January this year. For the first time, we are actually monitoring and enforcing this type



of law. Last week, we published a Command Paper to review the Town Planning Act, which will mean that all Government projects have to go through independent Development & Planning Commission before they get approved.

All these things we are doing; yet we are thriving as an economy, so the environment and the economy are not necessarily in conflict. They can work together, provided you know how to do it, and I think here in Gibraltar we are learning quite fast.

Clearly, in order to be able to advance an environmental agenda we need the support of the people. I have been working, as a lot of you will know, for the Gibraltar Ornithological and Natural History Society, as an NGO, and we have been working very hard for decades now, to gain the support of the people. This is not always easy, when you have monkeys climbing in through your windows and seagulls keeping you awake at night. So these are challenges, but nevertheless we still have the people on the side of the environment. When you do things like change a dirty car park into a brand new grassy public park, people clearly come on your side. The number of people that stop me in the street and say that their lives have been changed by Commonwealth Park, it is the sort of thing that does get the support of the people.

On the subjects we will be discussing during the course of the week, I think they are all particularly relevant to all of the small territories, and Gibraltar is just one example of all the different ones, who have all the different challenges, some very different, but some quite similar. In the session today on implementing biodiversity action plans, we have some experience here, but I think we can improve on this and learn from others.

Sustainable use of terrestrial and marine resources are particularly difficult to manage on small islands and peninsulas such as we are. As some of you know, we have had tremendous controversy when it comes to managing our fishing resources. This is because ours is not just a protected area, but it is a protected area which is also claimed by another country, which does not acknowledge that we own the waters which we are trying to protect. So this adds a tremendous complicated dimension to the question of marine protection.

Renewable energy is something which we are just starting in Gibraltar. It is something we should have been working on many many years ago, but we have only been in government for 3½ years. Already we are seeing the first solar photovoltaic

panels feeding into our grid. Already we have signed two Memoranda of Understanding to produce energy from waves and from marine currents, and we are working with pioneering companies to develop this kind of technology to replace the burning of fossil fuels.

Sustainable Development... I have already mentioned the progress we are making with our planning legislation. Our Development and Planning Commission is public; it sits in public. People can come along and make representations. It is an absolutely free vote. The Deputy Chief Minister and I both sit on it and we often vote in separate directions, and that is absolutely fine. I think that people are realizing that this is the way that good governance is done.

Environment education and awareness clearly is something which is very important.

So they are all very relevant subjects. Relevant to us, here in Gibraltar, and relevant, I am sure to everyone here.

This is the type of meeting which is not just a talking shop. We must make sure that we take things away with us and we make things happen. We have to make sure: that we all progress on our way to sustainability and carbon neutrality, which is possible in small territories such as ours; that we develop ways in which we restore and protect natural areas; and that we increase our knowledge of what our natural environment is. We have to take a message to a wider audience and not keep it within ourselves as small territories, not just to Her Majesty's government, but to a wider audience. We should make our small territories real examples of good environmental governance. I look forward to seeing all these things develop in the next few days. Thank you very much for your time this afternoon.

[Applause]

Special lecture

Conservation: the Gibraltar perspective revisited

Hon Dr John Cortés, Minister for Health, Environment, Energy and Climate Change, H.M. Government of Gibraltar

Mike Pienkowski: We have been very pleased how much of the conference that Minister Dr John Cortes has managed to attend, despite other matters of state. We are particularly pleased that he is back with us this evening. Now, as John will complain about me saying, to a highlight of the conference. In fact a highlight of the previous conference in Gibraltar in 2000 was when John, in a former life, gave a conservation view from a Gibraltar perspective to that conference. I'm afraid I looked up the proceedings, which you can all see on our website. Apparently although there were good relations between GONHS, which John was then heading up, and the then Government, there were some concerns. To quote, "noticeably the environment did not feature in any party's electoral manifesto earlier this year". Now I think that may have changed! So, John, in fact is revisiting a conservation view from a Gibraltar perspective, and we look forward very much to hearing it: Dr John Cortes.

John: Thank you Mike, thank you. Hello again. I always think it is a bad thing to watch the trailer of the movie, because the movie is always a let down, and he has said so many things about this. I do apologise if the trailer was better than the movie! Apologies also for not having been here all day. I really wanted to, but as Mike was saying, I've had to catch up on matters of State, because actually the Chief Minister and Deputy Chief Minister are currently halfway across the Atlantic on their



way to the United Nations Committee of 24. This is a very important thing for Gibraltar, so I am currently acting Chief Minister. So if there are any recommendations you wanted done, for the next 48 hours I can make it happen!

Mike asked me to give you an update and to revisit conservation in Gibraltar. I've actually found some of the slides that I used as cues in that talk. So I'll show you them later, because I think that it's quite interesting to have a look. I know that a lot of you have been saying lots of good things about Gibraltar – and I must say that from an environmental perspective there's a lot more good about Gibraltar now than there was 6 or 9 years ago. But I don't think we should for one moment think that we've done enough, that we've got all the answers, and that all is hunky-dory. I could give you a list of other things that aren't. I just needed to show a little bit of modesty there. I'm looking at my fantastic team and they're shaking their heads, saying no, we're absolutely wonderful. We are – but we've got a lot more to do.

Having said that, what I intend to do today is to take you through a little bit of a journey:

- give you a little bit of history of the natural history of Gibraltar, which is really where I started this other journey,
- and then take you through what I think has made a difference in Gibraltar in the last 3

- years since I joined the Government team and then show you a few photographs of things that we have been doing and things that I think you might enjoy.

One of the most significant things I think is actually the title; having put the title “Climate Change” into the name of the Department and the name of the Ministry, to me was an achievement in itself, because 3½ years ago nobody really cared about climate change in official circles in Gibraltar. So I think that is most significant.



In case you think that the sea-level is rising even faster than it is, that is sea-fog [*referring to above picture*]; otherwise we would be underwater right now.

Just going back to the UKOTCF Jersey conference in 2006, which is really where I more-or-less based the theme of my talk, this picture just to remind us that some of us do age and some of us do not.



From the left: Charles Perez, Dr Eric Shaw, Dr Mike Pienkowski, Dr John Cortes and the Bailiff of Jersey Sir Philip Bailhache at the opening of UKOTCF's 2006 Jersey Conference Biodiversity That Matters

The Rock of Gibraltar, a mass of Jurassic limestone, very well known through history, and very well known increasingly thanks to the work



of the Gibraltar Museum and others in pre-history. If you just consider that sea-levels during the last glaciation were much lower than they are now, and that to the east of Gibraltar there was a plain that went out a least 3-3½ km, this is probably what the view from the Rock would have been then.



This is the Cota Donana, in Andalusia and one of the key national parks in Europe, the first one that WWF was all about, and this is the type of



habitat that there would have been on the east side of Gibraltar, with the pine woodland which is also a feature of that. A lot of work done, on fossils, pollen and the archaeological evidence, which shows that this is what it used to look like.

The Rock of Gibraltar was a limestone mass, with lots of nice caves, which attracted birds

and wildlife, and Neanderthals, and then modern humans, who would go out to hunt on this massive plain to the east, and less so to the west. I will show you a little bit of bathymetry later which will show you that in proper perspective. And they would have been chasing after wild boars, which in fact became extinct in Gibraltar as recently as the 1700s.

One of the key things that a lot of people know about Gibraltar is bird migration – and I know that Mike has been off birdwatching on some of his trips here, again that’s where I started my interest in nature. It is a key place for migration of birds of prey, as well as seabirds (some of you will have seen shearwaters and Mediterranean gulls the other day), and also for small birds. It’s a key crossroads of bird migration.



In fact my theory is – my friends from GONHS and the Department are going to say “he’s at it again” – that the name of Gibraltar comes from the birds. Traditionally it is said to come from *Jebel Tarik*, Tarik having been the Moorish chieftain who took Gibraltar in 711. I don’t really like to have my homeland named after a warrior.



I’m sorry about that. *Jebel* is a mountain in Arabic, but the word *Taer* means ‘bird’ in Arabic. I’d much rather think that they came across and it was May, in which case they would see these



masses of honey buzzards coming in. There would have been many more than now, coming in across the Strait. So, they said “oh, this is *Jebel Taer*”, the Mountain of Birds. That is what I would like to think my homeland is named after, the birds and not the warring chieftain. A lot of our history is actually military history, and it’s very important, and the military still play a very important role in Gibraltar – but I still prefer *Jebel Taer*!

Gibraltar is well known in history, in natural history, and in the history of natural history. Gilbert White in 1711 referred to migration, possibly for the first time in at least semi-scientific writing, from his brother John who was here in Gibraltar. He was one of the priests of the garrison, and he reported “myriads of the swallow kind... bee-birds, hoopoes, oro pendols [golden orioles]... the various sorts of hawks and kites” I think that’s a lovely quote which I like to think makes Gibraltar so special: people actually found out about migration from Gibraltar.



Gibraltar in those days would have been much more wooded, and certainly earlier in Neanderthal times. Incidentally, you would have picked up by now I would imagine that we are a UK candidate site for UNESCO World Heritage this coming year. A lot of work has been done, to achieve that. We hope this will become a World Heritage Site before the next 12 months are out.

I've got to put in some of the other old writings, and this is from Portillo, a Spaniard writing before the British came in 1704. Talking about the great abundance of plants and herbs and shrubs and trees in such a small place, something that we still are very proud of, he writes about the damp crags, the caves, heavy soils and sands. He is already talking about the different habitats that there are in such a small place, and I think that, coming from the 1600s, this is a very interesting quote. Just picture the crags looking much as they do now, although much else has changed.



This is an interesting one: "In view of this in 1566, by decree of King Philip II ... there came to this City one of his herbalists who marvelled at the diversity of herbs that there were in such a small land." I think that is a lovely little reminder of how rich Gibraltar is, with all its little nooks and



crannies, and that's just to show one of the habitats. And yet again, talking about another habitat which sadly we've lost, the sands, there isn't much left of the sands on the isthmus. The airfield is there now for example. It's much more romantic in the Spanish: "Descending from the Hill you come to the sands where there is another great diversity of herbs which love this place until they reach the sea, where like in mirrors they seem to contemplate their reflection.", I mean, that's the sort of thing, so there are some plants contemplating their



reflection. [laughter]

I spoke about the sandy area. Gibraltar was linked to the mainland by an isthmus. It is still linked by an isthmus, but now we've got the airfield, football ground and housing estates and so on. This is something like the sort of habitat we used to have there.



The impact of man is very important even now – and the whole question of environmental governance is how we govern the impact of man on the environment. Gibraltar has experienced it through time. In 1620, Portillo referred to the amount of livestock. Cattle, pigs, sheep and goats were most abundant. He mentioned also about the extreme abundance of fish. I'll talk about the marine later on in my talk, but already these



issues are coming up. Livestock is an important issue. This (*above, previous page*) is a picture of a limestone hillside in nearby Spain. Below



is probably what the Upper Rock and the lower areas, particularly where the town is now, would have looked like in the 1600s.: this sort of habitat with trees and open ground.

From just before 1704, this (*above*) is another old print. You can see the town bottom left – in red. In much of the rest, there were fortifications, as you can see. This is obviously an artist's impression, but most of the rest was totally not built upon. Once again, this is a picture that I make in my mind, of the sort of habitat that we would have had in Gibraltar.



Later on, some of the British writers keep going back about how important Gibraltar was for health. They used to come here because there were so many trees, and it was so wonderful to be in the shade of trees. In fact, wood was shipped from Gibraltar to North Africa in Moorish times. This was probably through Gibraltar, rather than from Gibraltar. However, again I'm trying to give you a picture of a fairly heavily wooded hillside, which later got opened up to graze the cattle. And then clearly sheep and goats had a bit of an impact, and gradually we would have lost the tree cover that continued until Gibraltar, in the 1800s, was "entirely barren, there being neither grass nor



shrub, and the ground, covered with sharp, loose stones, ... has a disagreeable aspect."

Again, there were many trees prior to 1704 and these remained in 1727 when the regiments "who were encamped to the southwards, had leave to cut some for their firing, which they took in its full latitude and levelled almost the whole." That's a wonderful piece of writing. And, in fact, because Gibraltar was besieged, there was no source of fuel, so the troops would have gone up and removed all the trees. If you look at the species composition of the hillside in Gibraltar,



some work that I did many, many years ago as an undergraduate, this shows that all the big trees,



like the oaks and so on with seeds that can't travel back, are no longer there, except one very small patch of small oak at the very top of the Rock. So this is what the Rock would have looked like in the 1800s, fairly bare, hardly any trees in sight.



This is a picture of a similar hillside in Spain which I have just used to show you as a photograph rather than as a painting as the sort of aspect that I think the Rock would have had in those days. Clearly a very different species composition. A writer around about that time had nesting black wheatears which are no longer here, Dartford warblers, and so on. So birds of lower and more open habitat. Clearly, the goats which were then introduced, helped to keep the vegetation low and open and



didn't allow it to grow again until the Second World War, when the military built what we knew as the "unclimbable fence" from north to south. This stopped all the locals and all their animals from going further up. Then the habitat started to regenerate towards the maquis which we have now. The goats were removed also from the lower areas a few decades ago.

If we review the birds that we have at the moment, we don't have any large birds of prey nesting. We have 4 or 5 pairs of peregrine falcons, varying from one year to another. Some lesser kestrels nest, kestrels, little owls, and probably eagle owl. But in the 1800s we had at least a pair of osprey, as Saville Grey Ried said in 1871, a pair of Bonelli's eagles, and there were many swallows. Swallows don't nest on Gibraltar any more. I can't really go into all the reasons for this. Egyptian vultures



nested, lesser kestrels bred in numbers, probably a few hundred pairs, and rock doves. Now we've got the pigeons, but not the wild rock doves. The eagle owl which disappeared for many years, re-appeared about 10-15 years ago, and there are still eagle owls around. Nesting hasn't been proven in the last few years, but certainly we still have these birds around, and I know in the UK they're not very happy with them, we are very happy to have eagle owls; they love to feed on Gulls, so that helps us. Alpine swifts were always also extremely common. Now there are some small colonies but the blasting that took place disrupted that.

Gibraltar today doesn't look like it used to. There



has been a lot of blasting, quarrying to produce stone for some of the lovely historic walls that we have. The white limestone came from quarries here in Gibraltar. So a lot of the natural cliff habitat



was in fact lost round about the late 1700s and the early 1800s. This is another print of some of the craggy areas. That, in fact, Europa Pass is still there but a lot of the mass on the left hand side is no longer there. Just giving you another perspective, a couple of views of Gibraltar. That headland over there in the centre of the picture has all been quarried away and no longer exists, and in



fact Catalan Bay, which is a popular Bay with beach now is down below. So that is all gone.

Lots of things that have happened, through the years, where the environment in Gibraltar has changed. This is a particularly interesting one, and it does show how much an impact man can have negatively, and then in restoration positively. Those who went on either the terrestrial or the

marine tour will have seen the Great Sand Slopes on the east side of the Rock. As I said before, there were several kilometres of very sandy flat open ground to the east of Gibraltar, so the prevailing



easterly winds in those days would have piled a lot of this sand up against the cliff. Essentially, this is one large sand-dune stabilised by the Rock, so it's been there probably for tens of thousands of years. If you haven't been to the Museum, it's well worth a visit. This is an old model of the Rock. Apologies for the reflection in the glass, but it shows you what the sandslopes looked like.



Looked at from the village of Catalan Bay, in the mid-1800s, you can see already there had been some quarrying to make space for the village.

Here, we can see once again that rather bare sandy slope. There's the Caletta Hotel on those rocks



on the left hand side. So that's just to give you a couple of views of what the stabilised sand dunes looked like.

Then because of the lack of naturally occurring fresh-water in Gibraltar, engineers again in the 1800s, decided that they needed to collect water, so they blasted huge tanks, and they're still in use now, inside the rock. Then they got sheets of corrugated iron and, on a timber frame, they placed these sheets of corrugated iron on the east side covering the whole of the east side of Gibraltar



to collect rainwater and then channel it into huge reservoirs inside the Rock. I remember as a child, when it didn't rain enough, they used to bring tankers on their maiden voyages out from the UK full of water. We had to be very careful in water-use.

This (*bottom of previous column*) is a photograph of a view which I remember as a child, looking down from the top of the Rock. All those corrugated iron sheets and those channels, which had a gradient so the water would flow naturally into the tanks inside the rock. You can see that patch of water there. That area was used at the time to just dump rubble; that would not be allowed today, I can assure you! In fact, that has since recovered. The sea took it all away.



With time, there was an issue to maintain the catchment; the sheets would corrode and have to be replaced. This was very labour intensive, very expensive, and a huge health and safety risk. I remember sitting at the top of the rock one day watching raptor migration. A huge wind blew up and some of the sheets just whipped up and started flying. They could literally cut you in two. So the decision was taken at the time to remove the corrugated iron sheeting, and you can see some of it removed there.

There had been an intention to replace them with introduced species like hottentot fig. Fortunately, GONHS existed and we made representations to the Government of the time. That exotic planting was completely stopped, and the Botanic Gardens were engaged to collect seeds from similar habitats around the area and to sow it. And so now the habitat is restored and you can see it below, at



about 1 or 2 years into it.



Now there's been some succession and it's not as bright and colourful. However, the habitat has been restored essentially.



A little bit of a dark slide, but you can see how now that there is a fairly natural looking slope, and you can see from there as well. So there was a lot of gain there. Some of the plant species that had been lost were targeted and brought back, and they re-established themselves. So, I think that's a very good example of how we can, in fact, recover. It is about that time that the eagle owls and the ravens came back. Whether there was previously more habitat there, I don't really know, but migrants use the area. I saw a black stork there a year or



two ago; it just came by and decided to take a rest there. The Slopes are a fair percentage of the surface of Gibraltar, so I think that's a positive thing – and I wasn't even in Government at the time! [laughter]

Progress in natural history, the environment and their governance in Gibraltar

I'm going to go now to stop looking at pretty pictures and talk a little about the progress of the environment and of the governance of the environment and the natural history in Gibraltar. Some of my text slides from UKOTCF's 2006 Jersey conference provide a convenient framework [and key wording from these is in bold italics below].

Resources or resourcefulness .. which do you require in order to advance in nature protection? I looked at ***what we needed resources for***. Remember I was talking as the General Secretary of the Ornithological and Natural History Society. The word "journey" keeps cropping up, but it's a journey that I started with a lot of my friends and some of them are here, and we were talking about how the NGOs could develop in order to increase the influence that they had or would actually have. So we looked at ***organisational development*** aimed at ***protection of nature***, and then trying to use ***resources to improve the environment***.

Funds: what was the purpose that we needed funds for? We really needed to target and be sure that we had the right idea, and the right projects. Then we needed to have the ***people*** and the ***premises***, we needed ***equipment*** and ***vehicles***, and that all helps to increase your ***influence*** because you gain credibility. You know, you've got an address, you drive round with the logo on your car, or even with a car sticker, so all these sorts of things, and then the ***use of the media***. For instance, the Natural History Society had always used media extremely successfully. In those days, ***websites*** were fairly new, so all those were things that as an NGO we needed to bring together starting virtually from nothing.

Then ***money***, obviously, ***not for the sake of it***, not because you just wanted to have money, ***but targeted and for a purpose***. ***Support***, get the ***public*** on your side, work with ***other organisations***, work with the ***authorities*** and with ***government***, make sure that they came to rely on you, rather than see you as an opponent, and then spread your wings ***internationally***, Birdlife International, Plantlife, the Forum and so on, and

concentrate on increasing your **membership** so that you gain popular support.

And **from these resources**, you gain **knowledge**; you gain **support**; then you gain **protection** of the environment – which then means **success**.

At the time, I thought we were getting quite close, and I daresay that the Natural History Society in Gibraltar actually achieved more than people can imagine in getting “environment” to become a household word in Gibraltar. People stopped you in the street, asking you even something as what to do with the aphids on the roses, because they linked you and your colleagues to the environment. So it gave the environment a personality – which in a small community you can do. So I think that’s something that’s very important.

So these were things that I was thinking about at the time, that I shared with some of you in Jersey, and some of the others who aren’t here today. For some of the examples I used at the time, **representation on committees**, on the heritage committee, on the planning commission (which we were), I’ll talk about the Planning Commission in a little while. (I don’t want to over-run; I don’t have the timer display running though.)

Mike: We wouldn’t dare! [laughter]

Consultation, make sure you consult, but make sure you also get consulted and make a fuss when you don’t. Make people feel bad that they haven’t, and prove to them that they should have done, and then they would have got it right. I’ll give you one example now. Some of you may or may not be aware. (Drin [Lutchman] and Chris [Tydeman] [who both conducted the marine resources review for the Government of Gibraltar, commissioned via UKOTCF] know all about it.) The European Union declared a site put forward by Spain, not UK, a protected site, but in the waters of Gibraltar. That happened at the time when the former government had stopped consulting GONHS. And it wouldn’t have happened if they had consulted us. They didn’t. Spain, the local Spanish government and the British Government were consulted. Spain got away with it and all sorts of hell broke loose, and it’s not all settled yet. Unfortunately that’s another talk in itself.

So **getting into the minds**, and then leading to applying for **EU funds** which GONHS did successfully, **OTEP funds** which we did successfully as well, to produce our biodiversity action plan, and we employed somebody specifically to do that; I think he’s in this room. We got EU Interreg funds to go out and do research

in **Morocco**, to gain respect in the scientific community as well, to publish papers, to work with universities – so it’s not just conservation but actually working in science, and then applying the science.

Working as part of **UKOTCF**.

Clearly getting out the **publications** and then we produced a **biodiversity action plan**.

But what about now? I am now a Minister. How I became a Minister, and why I took the decision that I took are something to discuss over a beer! In order to become a member of a political party standing for election – which I more or less decided a month before the election – you need to have the confidence of your colleagues, and you have to be confident that you can make a difference. I think this was helped by the facts that: I was one of the people who had been, with many others, prominent in an NGO; and I was known, and people would realise that I would stand up for something I believed in. I know that a lot of people don’t think that politicians do this, but more of us do than you might think. But there we go and we are not all the same. So I had to remove the fear of the environmentalist from my political colleagues. I had to let them realise that what I was doing was for the good of Gibraltar and, if there was something you had to tweak in a project or a decision slightly in favour of the environment, that does not necessarily mean the project would fail – but it actually might mean that it would succeed even more. Then, get the environment to form a core of the manifesto.

So the present Chief Minister (campaigning as leader of the opposition at the time) would repeatedly say during the election campaign: “All my Ministers are Environment Ministers. – I expect them all to have the environment top of their agenda.”

We have introduced a green filter on projects. An aggressive green filter, that’s what I mean: chase it, if you’re not asked; you go and you find it. I learnt that in the NGO, hugely convenient and hugely useful training for a Minister.

Green procurement. We changed our policy, we really upgraded the number of points the tender process would give to environmental friendly companies, with environmentally friendly policies, and using environmentally friendly products. So we have generated a tremendous interest in the green economy. Companies are coming up.

GOVERNMENT LEAD

In all of these areas, a GSLP Liberal Government will lead by example. We will seek to ensure that by the end of our first term in office the Gibraltar Government uses only renewable resources where available (e.g. recycled paper and other stationery) and that the whole of the Government's transport fleet is powered insofar as possible by non-polluting engines.

ENVIRONMENTAL FILTER

Every decision made by a GSLP Liberal Government will be considered for its environmental impact.

CLIMATE CHANGE

As we set out in earlier Manifestos, we are concerned about climate change and our policy objective is clear: we will set out to achieve a carbon neutral footprint for Gibraltar. It may not be possible to achieve this in four years, but it must be our central environmental objective. This means more than just limiting the level of emissions or gradually reducing them. It means ZERO net emissions. We have to develop measures that remove carbon as well as ones reducing emissions, producing a Gibraltar, as a result, which can be proud not to be contributing to the problem our planet faces and serving as an example to others. To achieve this we will involve the local environmental NGOs and the international expertise required where necessary. In terms of financial commitment: we shall start by providing at

least £1m to provide financial inducements in each budget in support of promoting environmentally beneficial changes.

ENVIRONMENTAL ENFORCEMENT TEAM

We will establish an Environmental Enforcement Team which will work at sea in protecting our natural habitat from foreign fishermen and divers who do not respect our environment and the biodiversity in the waters around Gibraltar.

RECYCLING

We will promote a programme for education to ensure that recycling facilities are used properly and that our people appreciate the need to recycle. We will, as part of this initiative, seek to establish a recycling "eco park" in an appropriate location and this will include facilities for recycling of paper.

HYBRID VEHICLES

We will enhance tax and cash incentives for people who buy hybrid vehicles.

RENEWABLE ENERGY FUNDING

We will seek European funding for projects involving renewable energy for Gibraltar. We should be tapping any available EU funds to see if we are able to take advantage of renewable energy in Gibraltar.

SOLAR LIGHTING

We will explore the use of solar energy for street lighting and in Government buildings as well as in new co-ownership developments.

Everybody wants to sell solar panels now. They didn't even think about it previously.

Everybody wants to sell electric cars. We procured them too. The Chief Minister has an electric Tesla, and all official cars are hybrids – they use hardly any fuel.

But to go back to the manifesto issue, above are little excerpts of our election manifesto. In all these areas, Government will lead by example, use only renewable resources where available. We changed to recycled paper on week one, so all paper used by government is now recycled; that was one of the first things we did.

The environmental filter, having a million pounds dedicated to inducements to combat climate change. An environmental enforcement team, which we now have. You couldn't recycle paper in Gibraltar on 9 December 2011 when the elections were held; a year later, our recycling success is so great we can hardly cope, and we have to find other ways of actually dealing with the material.

The people respond if you give them a lead. It is important to keep in touch with the NGO and to remember that they are a crucial part of the team in bringing this forward. I meet regularly with them. Only last week we were talking about how on earth we could save the lesser kestrel.

Another entity, the local NCC, is a small body of 5 scientists who advise me on matters to do with the natural environment. It had been defunct. It hadn't even met for years. I had been a member from the start and it hadn't met once. So now I have re-formed it, and now we meet regularly, and I consult them regularly on every key issue that I do. And when I don't, because I forget, they will remind me – but that's the way I used to do it, so I can't complain!

This is very important, and you have to have the courage to just stand up and be counted. I think you also have to have luck. I mean I was very lucky to have wonderful colleagues in the Botanic Gardens and in GONHS. I am really lucky to have wonderful colleagues in the Department of the Environment; you couldn't find better scientists working in the public service anywhere in the world. But I suppose sometimes, you know, you need to nurture them and support them, and run them off their feet! [laughter]

Then you have got to make sure you keep the support from your colleagues; it's not always easy. But the majority of times they always do that little bit different, do that little bit extra, to make sure that we are protected and that we do what we are meant to do. You've got to have vision, even if

you don't realise that that's what it is – because if you really have vision, you probably don't know it's vision; you just think, you know, that's the way things should be. And then you keep at it.

Let me just, by way of a few examples, talk to you about some of the laws we have passed in the last 3½ years, and I've left some out. The Upper Rock was declared an SPA (Special Protection Area) under the EU Birds Directive – which it hadn't been, surprisingly. And the importance of the EU, the fact that Gibraltar is a part of the EU, for the environment, it's tremendous. This is because we have had to pass environmental laws, whether they were difficult, whether we had the resources or whether we didn't, the important thing is that you have to pass these laws, then it becomes your problem and you deal with it. So sometimes you struggle, sometimes you are stretched, but we have to pass the laws.

We have to keep to emissions targets; we have to keep to our recycling targets; we have to keep to our energy efficiency targets; we have to have a renewable energy action plan. We have no choice; we have deadlines. And, even though the Government of Gibraltar was far behind in time and in the number of EU Directives it had to pass, by the time our first year was up we were completely up to date, more up to date than any European country, in having Directives part of Gibraltar Law. So the EU has been really important and that's a benefit.

So we declared the Upper Rock a Special Protected Area, and we expanded the Upper Rock Nature Reserve to create a Gibraltar Nature Reserve. We introduced regulations. We had created the Botanic Garden, which was just a Botanic Garden by name; now there's an Act and its aims are there, its Law. And it has to remain a Botanic Garden. We passed an Act to make Commonwealth Park also part of the Law of Gibraltar. And we have also laws in these:

- the reduction in duty on electric and hybrid vehicles;
- tax incentives on solar panels;
- tax incentives for increase in energy performance on buildings (as from this year, if your energy performance certificate this year is better than last year's, you get a tax rebate. So we are actually encouraging people, particularly businesses, to improve their energy performance, because they've got something. And if next year it's even better, then they can get it again. So that is actually something

which stimulates all these things.);

- tax on plastic bags;
- improvements to the Upper Rock Nature Reserve;
- and the planning process.

I really need to take a few minutes to talk about the planning process. The planning process in Gibraltar used to be, four years ago, chaired by the Minister for Economic Development. There was one other Minister there, as well as mainly civil servants, a representative of the Ministry of Defence, two NGOs: the Gibraltar Heritage Trust which concentrated on built heritage, and the Ornithological and Natural History Society which I represented. They were secret meetings; there was no agenda published; there were no minutes published; and I walked out on a couple of occasions, for all sorts of reasons.

When we came into government, we increased the representation of NGOs by one, by including the Environmental Safety Group, which is another environmental NGO. The Minister no longer chairs; the Town Planner now chairs the Planning Commission. The Chief Technical Officer of the Government is there. The meetings are now held in public. People can go and present their project. And something that couldn't happen before, people can go and sit there and say why they oppose the project. So it's completely open and completely transparent. As I said the other day, the Deputy Chief Minister, who sits with me, and I, often don't vote in the same direction. And it doesn't matter because we are there as individuals. OK, we carry the responsibility of being Government Ministers but we genuinely and openly say what we feel. If a civil servant votes against what people might perceive as the Government's policy, that doesn't matter either. So there's been a huge improvement in planning.

And as from passing later in the year the command paper that I and the Deputy Chief Minister mentioned the other day (presuming that we get elected, because we've got another election to come – I might be sweeping paths in the Botanic Gardens before the end of the year [laughter]), Government projects will actually go through the planning process, and if they are thrown out by the Planning Commission, they won't get done. I think that is hugely important. We still have a thriving economy, and we still have a great democracy.

I'll just throw a few more things in.
Commonwealth Park - some of you will have seen



- used to be a car park. It even attracted a little egret there, in the pool in the centre, for a week
- people had never ever seen these in their lives. This family is having a look at a Little Egret.



For the macaques, we've carried on working with the stakeholders and the team, now I am responsible as Minister, in getting that forward, and we carry on doing research with the key players from the vet clinic, Natural History Society and others.



We've carried out improvements on the Upper Rock, like providing ponds which they use which they didn't have before, and providing shading for the food, so it doesn't dry up in the summer sun. I'm just going through a few projects as I come to the end.



I think that's a lovely photograph *[below]*. It's not mine. Most of these photographs aren't mine. I have a long list of people to be grateful to for these.



This one *[below, on next page]* isn't mine either, Charlie *[laughter]* If you want a bird that you associate with the town, the urban landscape, that people love to hear, that people love to see, swifts are it. You saw some this morning as we were taking the conference photograph. Swifts were reducing in numbers, because rooftops were done in a different way. The Planning Commission in fact, when I was sitting there as a GONHS representative, took a view on that all private projects involving roofs where swift nests were to be lost in re-roofing, had to have swift boxes



provided. Now we've gone a step further. Now it's an absolute obligation and now the Government is doing it itself in its own buildings. So we are putting up swift boxes around the place and as a corollary of that we are also putting up bat boxes.



So that is a Government initiative, and now we can clearly say to private developers, look you've got to put it up in your buildings because we're putting it up in ours. The colonies are setting up, the swifts are taking the nests, and we've got lots of



swifts. People love it, and you can talk to people about swifts, and they all welcome it because it's such a wonderful bird to have.

We have carried on investing in the Botanic Gardens. I think it's a hugely important part of Gibraltar, which has continued to improve. Some people come to me and say "I've been to the Alameda Gardens (that's the name of the Gardens) and I'm sorry to say it's looking really good, you know" almost as if I was hoping it would go to rack and ruin because I wasn't running them anymore! But I say "No, that's wonderful. I really



want them to be better than they used to be." And they're really doing excellent work there, not just in the public areas, but particularly with the scientific collection. They really are doing some marvellous work. (One of the things I miss most is my regular trips to Kew, Colin [Clubbe]. I must go there again, and I said that to you the other day.) The Government has been very happy to support the Gardens. And those of you who can, I would recommend to go with Keith [Bensusan] and his team to have a look round the Botanic Gardens; there's lots of things that are happening there, and it's absolutely wonderful.

This is a bellflower, and I just put it in because I was walking down Main Street the other day (actually more than the other day because it



flowers in April-May, so a few weeks – time flies when you are having fun!), and I came across this on one of the historic walls. These historic walls tend to get cleaned by the heritage department, and I didn't want them to remove these flowers because they are beautiful, and they're not that common. So actually I sent a quick email to my colleague,



the Minister for Heritage, and said, with this photo, “look, these are growing on this wall, I know you are going to clean them. Make sure they are not removed”. So they weren't removed. And the walls were cleaned. And that's the sort of thing that one can do in a small place when you know the people and you've got a little bit of, I don't



know, cheek. [laughter]

Sadly the Lesser Kestrel isn't faring so well. I don't think that there's anything we can do about it in Gibraltar. I had a meeting with Charlie [Perez] and Keith [Bensusan] from GONHS last week to discuss it. We're going to try and hit at feral pigeons and so on, but I use this as an introduction to something else. This area [top of next column] which is a military training area, is a wonderful area for migrant birds. It is part of the Barbary Partridge project, I've got some further news about that in a minute, but it is also the area that Vincent Robba and his team from GONHS use for



bird of prey rehabilitation and captive breeding, and they've really been very successful. This is Vincent with a peregrine, and they're breeding



peregrines every year, training the young, releasing them. We suspect that one actually may be nesting in Seville, because there's a ringed bird there, and they haven't ringed young birds in the area. They have bred lesser kestrels and released Bonelli's eagles and so they do a lot of wonderful work rescuing birds. Gulls, some of you will probably know, do mob birds of prey, force them into the sea or down onto the land, and people will take them to Vincent and his team. They do a wonderful job with rehabilitation, so largely by the NGO, but with Government support now.





Another project that GONHS and the Department of the Environment and Climate Change are working on is the Barbary Partridge, very typical of Gibraltar, most likely introduced but the only partridge that we have here. It's effectively the

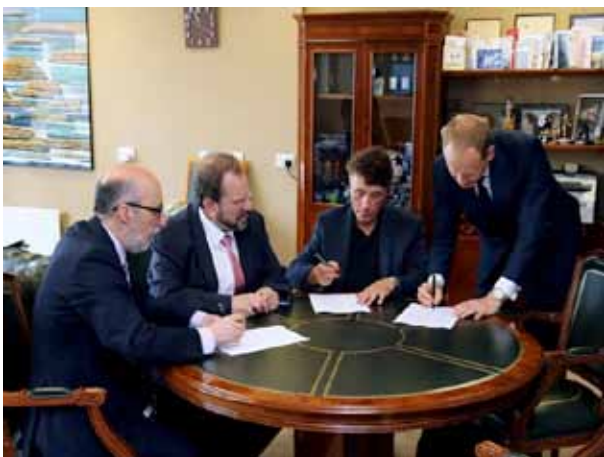
National Bird of Gibraltar. Numbers were low due to predation, lack of habitat, and all sorts of other things, so we started a programme clearing habitat and dealing with some of the other problems. Then we've started a re-introduction. So Steven Warr went over with one or two people and we brought over eggs and chicks. Some were hatched and released.

Some of these young Barbary Partridges bred in captivity, so we've had more eggs this year, and they've been released. They were all marked, with wing tags or rings, and they're now breeding all over the place. They've taken to the new habitat, and they've paired up with some of the local birds. So we know that it's been successful in that respect. It's a lovely bird and we are going to keep on doing this. We are going to keep on monitoring. It's a good example of as something that GONHS had wanted to do for years, but we never had the resources or perhaps even the political clout. We've now been able to combine resources with the Government to do that.





Making the news with the media, and having a presentation with all the stakeholders and the Department and GONHS and presenting it, to the media to get the public on our side.



We've also reached out in other ways. This is a signing ceremony with Blue Shark for marine turbine development.



We've also moved beyond Gibraltar. This is the Chief Minister and myself with Al Gore, who came to Gibraltar and gave a conference. A thousand people attended, and it kick-started the whole thinking about green. Whether you like Al Gore or not, or what he stands for, he's an absolutely brilliant speaker; no-one can deny that, and it did a lot. A lot of people tried to make negative

publicity of it, but then we were invited, as a result of that, to Washington to President Obama's inauguration ceremony, which was a wonderful experience – which would be a talk in itself!



So bringing Al Gore for environmental reasons opened up many opportunities. Now we have established trade links with the United States. The American Chamber of Commerce then set up in Gibraltar. They've had two trade missions to Gibraltar, and all sorts of things are happening bringing economic progress to Gibraltar, as a result of spreading our wings.

I'm here at IUCN [below] with Daniella Tilbury, who's the Vice-Chancellor of Gibraltar University, whom some of you will have met. I had the privilege of attending the World Climate Change Summit, in New York.





In the next ones *[above & below]*, I'm in New York last year, representing the City of Gibraltar, which was a wonderful experience.



I'm putting a few other international link pictures. I mentioned Morocco; this is with some of my colleagues (again some of us don't age, do we?) in some of the work we've done in Morocco, because that's set us in context. Gibraltar, a small territory, could be very insular and maybe not look at the



wider context. Here we have Morocco on the other side of the Strait. And we weren't doing anything there so we twinned up and we did this Interreg project.



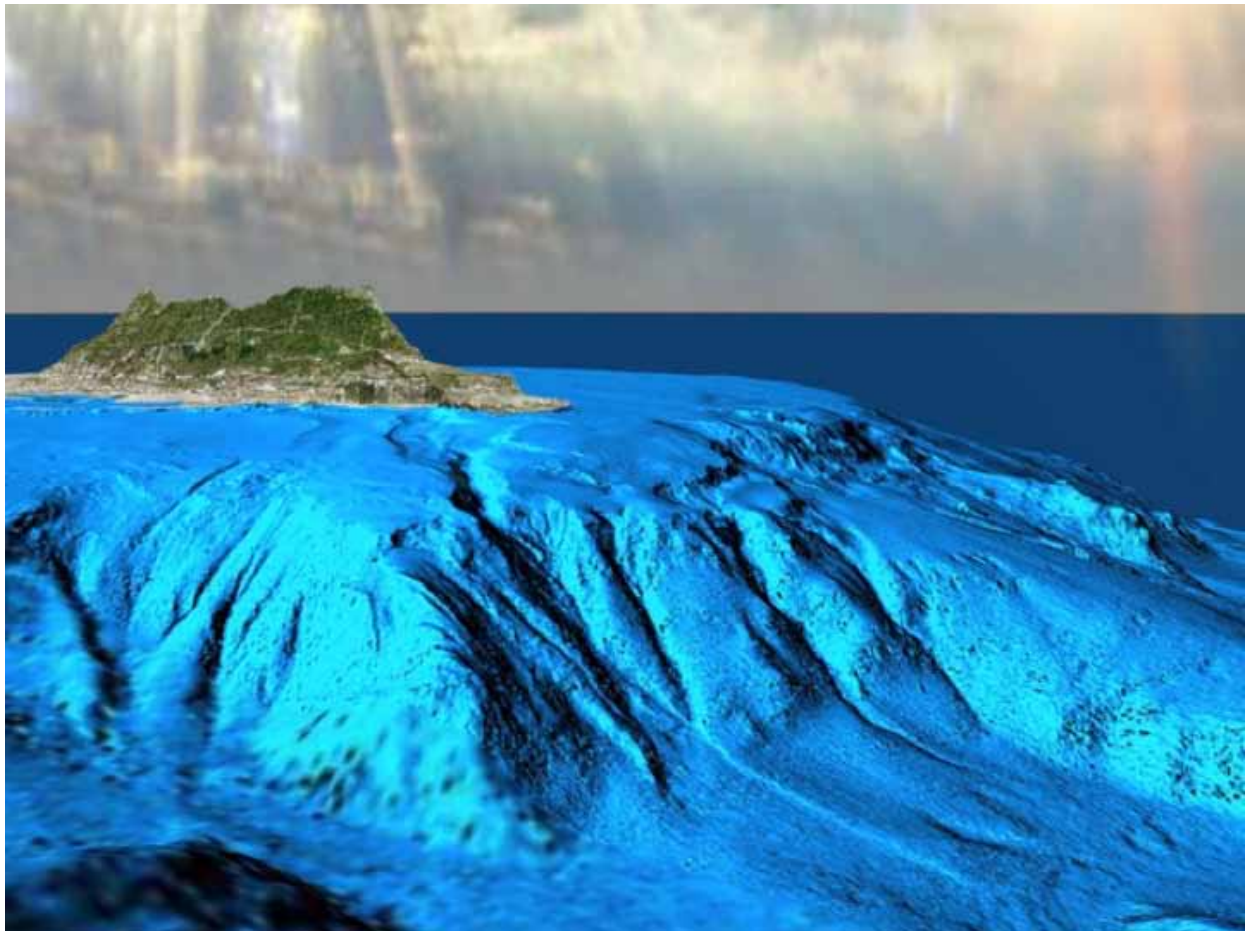
I still keep contact in Spain. Here, apart from me, we have the biologists from the city council of the town just across the Bay, Los Barrios, and we have a former director of Jerez Zoo, one of the main and most conservation minded zoos in Spain. Some people think that this is bizarre, because there is a huge problem with Spain. But it is never at a level of true environmentalists. But, I work very well with colleagues in Spain, and I'm still on the Board of the largest nature reserve in Spain, which is just across the Bay. I'm the Minister for the Environment of Gibraltar and yet I regularly attend meetings with other colleagues. Why not? I'm really really pleased and that's a great thing to do.

I'm going to end up with some marine issues, again something that was started by NGOs. We created a Gibraltar Marine Reserve on the 1st January this year [2015] by enacting the new Marine Reserve regulations.

One of first things that we did is to do a full bathymetric survey of the waters of Gibraltar. This *[top of next page]* is just one slide of many. And you can see the shelf. Just by the sea level being a bit lower, how much land there would be, or there was, around Gibraltar. And what a marvellous habitat that must have been, in those days.

We had declared a nature reserve, we





want to protect our waters, and we didn't even know what our seabed looked like. So, we did a full bathymetric survey.

You will have seen dolphins, those of you who went on the sea. We have whales as well. Fin whales, and sperm whales are regular, as well as pilot whales and others, so it's very rich. A lot of the management work started many many years ago, again something which was done by GONHS and led by Eric [Shaw], who you will have seen. I don't know whether he's here today but he was here yesterday,

Starting by building artificial reefs and, in those days, that's a couple of decades ago, you cleaned it a little bit and then you sank it. Nowadays it's got



to be very rigorous, absolutely totally clean. You have to keep to the requirements of the Barcelona Convention, although Britain never extended it to Gibraltar. Now, this is interesting, because the other day we were talking about international instruments that the UK would sign to and try to force on the UKOTs. Here is one UKOT wanting





the UK to extend a Convention to it.

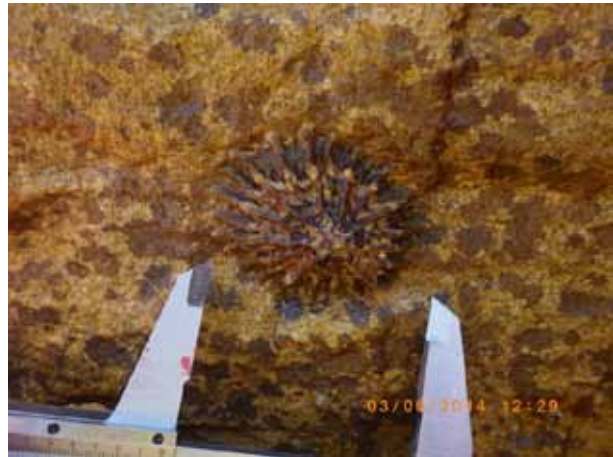
Now we've got to be very careful; we've got to make sure we do it right. And we do. We needed to protect this beach. We had to import sand from the Sahara, because Spain wouldn't allow any of the sand to come through the border. Because they said that we were reclaiming, we were going to build out. So, they banned sand and rock coming from Spain. So we had to import the rock from Morocco. The sand is actually quite pinkish because it comes from the former Spanish Sahara – now part of Morocco, otherwise that would have been a problem! [laughter]

What have we done now? We've declared that a protected area. So we've created new habitat, and we've declared it a no-fishing zone. And the fishing people are quite happy about that, because it's new; therefore they're not losing anything. So we have just created another island in the harbour, as part of building a small boat marina, and protecting all the wildlife around it, via the fishing working group. We set this up following the recommendations from the Drin and Chris report. And that's just another view of the beach protection exercise. You see that the arm going out at the top has a kink at the beginning. It was supposed originally to go straight out, but there's a natural reef there. So we sat with the people in



the technical services department and said: OK, wonderful, this is going to create new habitat, but don't go over the reef.. So they changed the plans, and they avoided the reef. We've still got a beach, and we kept the reef. So this is the sort of thing that being in the right place at the right time you can make happen.

A few other things that we are doing. This is the Mediterranean red limpet which is a protected species at a European level. There has been



some reclamation which we needed to do in order to build our new power station. So we had the area surveyed, we counted and measured all the limpets, and identified them all, marked them, and spent quite a bit of money in order to lift every





single rock that had one of those limpets on it, and replace it somewhere where there is no chance any reclamation is ever going to happen. So we completely moved the lot. Here is one of the rocks is going into place.



Then we created an artificial reef using a design we picked up on a Spanish website so they couldn't complain, but they complained anyway. [laughter] This led to 8 hour frontier queues and claims that we were usurping Spanish waters and so on. But it didn't matter, we persevered. Well it did matter because a lot of people suffered a lot, that summer. And it also caused the Government some political concern because there were people saying "Ah, look at these environmentalists having



these rocks and taking 4 hours, 8 hours to get to my house in Spain". So there was a little bit of that. But we were right in what we did. We then got a question to the European Commission. The European Commission looked completely at all documents. Because everything goes through EIAs, and we do our own assessments too, the European Commission concluded that we had done everything by the book and there was nothing to be complained about. So complete vindication – and more vindication than that is the fact that it's been colonised by marine life. These are photographs taken in the area, so clearly we did the right thing.

Everybody's forgotten now. If there's a queue at the frontier it's probably because Spain has played a football match and maybe we're supporting the

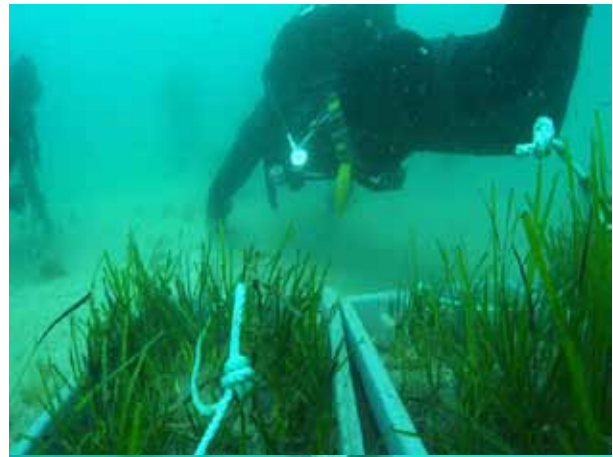


other team. [laughter]

Another thing that we did was locating these large shells *Perna rudis* and *Perna nobilis*, so they were moved from an area which was going to have turbidity due to some works, and placed them in another area, north of this artificial reef.



Another thing that we did: we had lost the seagrasses, so we got together with the University of the Algarve, and got them to grow some seagrasses in trays for us, brought them over, planted them, and now we've got seagrasses colonising again. We're keeping them under close surveillance. We don't know whether we'll succeed. It often fails, but so far, and they've been there for 6 weeks, they are still doing well. I'll



prove to you how well they're doing in a minute.

Gibraltar has a very rich marine life, but people usually see it on their plates, and a lot of people

know it, but a lot of people don't. So we wanted to find a way of taking marine life to the home. So we got in touch with an American company, our diving team, together with the Americans came over, and placed this camera on the seabed, and that's the camera there, on the seabed, and this is the sort of image that Can we go on to it now? We are hopefully going to have a live feed from the camera right now. It's just quite dark and late in the day now, and it's a slow connection..... *[live*



feed seen, from undersea camera] Oh, there you go, that's live. That camera can actually be panned to look at the plot of seagrass, so we can actually monitor how the seagrass is doing on a daily basis from our office. There's often a lot more activity than that. Sometimes there isn't, but it's the first of its kind in Europe. We have another one we're going to set up quite soon.

Thinkinggreen.gov.gi : click on underwater camera and you'll get to it, from anywhere in the world. [Below, at top of next column] is a screenshot from the camera, with fish.

We now have an environmental enforcement team. On a recent occasion there was a ghost net, a net that had been abandoned, and we actually managed to go out, a lot of hard, back-breaking work, and took the net away. We now have the capability of



doing that sort of thing.

At about the same time as installing the camera, we sank a vessel to form part of the artificial reef. I'm going to show you a video taken of the last vessel that was sunk. This had long been a tug in Gibraltar Harbour, and people wanted to throw it away, break it up and sell it. So the Government decided to arrange for its cleaning



out, and engaged with the Natural History Society, the Helping Hand Trust, and the Department of the Environment, got it all together, and sank it. *[video shown]* I'd like to acknowledge the local videoing company that did that.

There you go, I think that's marvellous. This just



thank you for giving me the opportunity to do this. It's a long journey still to go, and lots of challenges ahead, but let this serve as a lesson. If you really want to do it, you can do it.

[Applause]

goes to show that, you know, sometimes bringing green areas and nature to the people does work.

Wonderful evenings, wine tasting evenings and so on now take place in Commonwealth Park, which used to be a car park. You could never find space in it either, so why keep a car park you could never find space in.

I think there's one more picture. Oh yes, it's a



lovely photograph isn't it. Absolutely wonderful. A flamingo flying towards Gibraltar.



So I think that's it. I've taken longer than I thought, so do forgive me. I had a lot of things to tell. There's a lot more as well! [laughter] But I

Session 2: UKOTCF's Wider Caribbean Working Group

Joint Chairmen: Bruce Dinwiddy & Boyd McCleary

Secretary: Ann Pienkowski, with Dace Ground

The discussions at the Wider Caribbean Working Group contributed to the Conclusions and Recommendations, and relevant points are incorporated in that section. Other discussions have been reported in the minutes of the meeting, circulated to participants and other members of WCWG.



From left: Boyd McCleary, Bruce Dinwiddy & Ann Pienkowski



Above and top of next page: WCWG in session



Right: the Bermuda contingent: (from left) Andrew Dobson, Annie Glasspool, Jennifer Gray, Arlene Brock, Dace Ground, Alison Copeland)

Below: A good proportion of the Caribbean contingent: (from left) Stephen Mendes, Andrew Dobson, Nancy Pascoe, Bryan Naqqi Manco, Farah Mukhida, Christina Pineda, Claude Hogan, Susan Zaluski, Lyndon John, Gina Ebanks-Petrie

(These two photos: Andrew Dobson)



Session 3: Field visits

The conference field-trips on the first morning had several purposes. These include: a little recovery time in the fresh air after long travel for most participants; a chance for participants to chat informally before the main sessions, which has been found to make the latter most effective; and a chance to see something of Gibraltar, its environment and some current issues. These included a boat trip to see something of the marine environment, which is very rich in this area, where the Atlantic and the Mediterranean meet in the Straits and Bay of Gibraltar, or a terrestrial tour of the Upper Rock to view some of the re-introduction and restoration work. On the morning after the conference, some of those with afternoon departure flights took the opportunity of either a version of the Upper Rock trip or a walk around the Botanic Gardens, guided by their Director, Dr Keith Bensusan, and his staff.

Date with dolphins

The morning weather was a bit of a worry with grey skies and moisture in the air. However, after reassurance from Charlie Perez, General Secretary of the Gibraltar Ornithological and Natural History Society that these were perfect conditions for a boat trip and a tip of that fin whales *Balaenoptera physalus* (the fastest whale and second largest after its close relative, blue whales), we set off for the marina a few minutes away. As there is plenty of things to see along the way down to the marina, including the newly established Commonwealth Park, we packed the delegates in to small buses to ensure that they didn't wander off and miss the boat!



A bus-load of biologists and friends. Photo: Mike Pienkowski

Getting ready for departure. Photo: Bryan Naqqi Manco



Tony and Angie, of Dolphin Adventures, expertly captained our vessel for the morning, a bright yellow boat



On watch. Photo: Katie Medcalf

filled to capacity. Marine biologist, Rebecca was also on hand to answer any questions. Gibraltar's wildlife obviously knew that an expectant party of conservationists, scientists and general wildlife nuts were there, as pods of common dolphins *Delphinus delphis* and some other species were seen almost immediately and in great numbers all around the boat as we continued in to the Strait. We also had some great views of a number of bird species including a shag *Phalacrocorax aristotelis* (great for those large cameras at the front of the boat).

Line of dolphins. Photo: Mike Pienkowski





Dolphin. Photo: Mike Pienkowski

Government of Gibraltar Senior Environment Officer, Stephen Warr, gave an overview of the marine environment and the work which the Government is current doing to protect it. He told us about the newly installed underwater camera, which was already giving some interesting insights in to the underwater world.



Europa Point lighthouse. Photo: Katie Medcalf

As we had a little longer on the trip, we were able to visit and view the entrance of Gorham's Cave, on the eastern side, from the sea. This is a Tentative World Heritage Site on cultural grounds, with many features of interest to human pre-history, especially in relation to the culture and ecology of Neanderthal Man.

In the turquoise water around the caves we saw



Entrances to the caves. Photo: Mike Pienkowski



In the entrance to the caves. Photo: Bryan Naqqi Manco

juvenile sea-bass and many jellyfish (Photo: Mike Pienkowski). Local reports of juvenile Portuguese



Man O' War being found in abundance off the coast of Gibraltar have led to areas of the shallow waters being sectioned off to protect swimmers from painful stings. Bermudan colleagues told us how the adults are often found in their waters. Perhaps the juveniles leave Gibraltar waters and cross the Atlantic in ocean currents and arrive in Bermuda waters linking two of the UKOTs?

Keith Bensusan, of Gibraltar Ornithological and Natural History Society and Director of the



Stephen Warr explaining matters, with Esther Bertram of Falklands Conservation. Photo: Bryan Naqqi Manco



Old Water catchment. Photo: Mike Pienkowski

Botanic Gardens, (GONHS) talked about the work which is ongoing and the former water catchment area which is now being restored using native plants.

Despite the whales never showing their heads (or tails), the views of the dolphins at the bow of the boat and the Rock wrapped in mist, surrounded by bright blue sky made up for it. All disembarked the boat with huge grins, although our youngest sailor, 18 month old Dylan, who had dropped his favourite cuddly toy in the middle of the Strait, left the boat feeling very upset and even the pink dolphin he was offered just wouldn't do!

Rockin' around the Rock

Although botanically, July is not the best time to visit Gibraltar, delegates were treated to a personal tour of the Rock with Dr Liesl Mesilio Torres, Chief Executive Officer of the Department of Environment (DoE) in Gibraltar, and Charlie Perez from GONHS. Liesl has a background in Environmental Science and Geochemistry. She gave an overview of activities, which are currently being undertaken as part of the Upper Rock Management Plan.



*Liesl Torres guides the terrestrial tour.
Photo: Michele Sanchez & Martin Hamilton*

Gibraltar is the only place on mainland Europe where the barbary partridge *Alectoris barbara* is



The Rock emerging from the morning mist. Photo: Mike Pienkowski



Barbary partridge on the Rock. Photo: Andrew Dobson

found and where it is illegal to hunt them. Many consider it to be the National bird. Threats to the partridge include feral cats, disease transmitted by chickens and loss of habitat. The DoE and GONHS are working together to help the partridges survive locally by clearing plants and shrubs in areas of the Upper Rock Nature Reserve as well as educating the public.



*View from the Upper Rock.
Photo: Catherine Wensink, UKOTCF*

A presentation by Eric Shaw and Bryan Ritchie at the Apes' Den about the ongoing refurbishment of the feeding and foraging areas for the famous macaques was given. The Barbary macaque population in Gibraltar is the only wild monkey



Barbary macaques on the Rock. Photo: GONHS

population in Europe. They are descended from North African populations and have become synonymous with Gibraltar. The DoE and local non-government organisation, the Helping Hand Trust, are working hard to ensure that they behave as naturally as possible. Feeding is strictly prohibited and signs can be seen all over Gibraltar warning locals and tourists.

St. Michael's Cave was the next stop, although it was to be the venue for the closing dinner (see pages 447-453), it is so spectacular that it is definitely worth more than one visit. It is a very large cave with stalactites and stalagmites, dating back millions of years. This cave, once a temporary hospital during the Second World War, is now a tourist attraction and a natural auditorium used for many events.

The old northern defences of Gibraltar, known as the Upper Galleries were a chance to see the man made tunnels that defended Gibraltar during the Great Siege 1779-1783.



(Above) Gallery construction memorial sign; (top of next column) in the tunnels; gun, overlooking the approaches from the north. Photos: Mike Pienkowski



Views of the Moorish Castle and Old Town Calpe are pretty spectacular from here.

The final stop on the tour was a walk around Europa Point. The natural landscaping using endemic plants such as sea lavender and the spectacular views across the Strait to Morocco allow some relative tranquility compared to the bustling Main Street in Gibraltar.

The lighthouse was built in the mid 1800's and is now used as a radio transmitter. It is the only lighthouse outside the mainland UK, for which Trinity House (a UK authority under Royal Charter which maintains lighthouses) is responsible.

As an example of Gibraltar's religious tolerance and integration, two large places of worship remain here side-by-side. The Ibrahim-al-Ibrahim Mosque,



Sea lavender. Photo: Catherine Wensink, UKOTCF

a gift from King Fahd of Saudi Arabia taking two years to build at a cost of around £5million, contains a school, library and lecture hall. The Shrine of Our Lady of Europe was built after 1462, when the Spanish recaptured Gibraltar from the Moors.

A popular tourist site is the Sikorski Memorial (below; Photo: Mike Pienkowski). This commemorates the 1943 Gibraltar B-24 crash 4 July 1943, which caused the death of General Wladyslaw Sikorski, the commander-in-chief of the Polish Armed Forces and Prime Minister of



View northwards from the tunnels: over the isthmus, now with the runway and the main highway crossing it, to the terminal and the frontier just beyond. Photo: Mike Pienkowski

Below: views on the tour of the Botanic Garden.
Photos: Bryan Naqqi Manco



the Polish Government-in-exile. Fifteen other people also died in the crash, with only the pilot, Eduard Prchal, surviving. Those with a mind for conspiracy theories would be interested in those surrounding the nature of the crash and his death. Since 2008, the Polish Institute of National Remembrance has been investigating the accident.

Tour of Botanic Garden

At the end of a very full conference, delegates were offered the chance to look around the Gibraltar Botanic Gardens. Many of the conference participants are involved with their own botanic gardens in the territories, and so learning a bit about what they are doing in Gibraltar was an added bonus – especially after being indoors for several days.

The Gardens grow plants from all over the world, including some from some of the UKOTs, for example St Helena. However, it specialises in species from Mediterranean and arid habitats. The collections are documented and managed for scientific and conservation purposes. It also keeps *ex situ* collections of some of Gibraltar's flora, and has reintroduced these to areas around the Rock. The Gibraltar Ornithological and Natural History Society office, which also has an interesting collection of invertebrate specimens, is situated here and works closely with the Garden on conservation projects. Recently, this included the rediscovery and subsequent propagation of the endemic Gibraltar campion *Silene tomentosa*.



Above: Dr Keith Bensusan shows the tour some of the GONHS/Botanic Garden collections.
Photo: Bryan Naqqi Manco

Session 4: Implementing biodiversity action plans in the context of Environment Charters, Aichi Targets etc, and including environmental monitoring

Chairing & facilitating team: Liz Charter (Isle of Man), Mike Pienkowski (UKOTCF), Catherine Wensink (UKOTCF) & Lyndon John (St Lucia)

Introduction to session: projects in the territories within the international conservation framework – Liz Charter (Isle of Man Government)
An overview of progress in implementing the Environment Charters and moving towards the Aichi Targets – Sarah Barnsley, Emma Cary, Mike Pienkowski & Catherine Wensink (UKOTCF)
Rodent eradication on South Georgia: global-scale conservation is within the reach of small NGOs – Tony Martin (South Georgia Heritage Trust)
Mapping invasive Japanese knotweed in Jersey, Channel Islands – Tim Liddiard (States of Jersey)
Current and planned invasive species removal exercises – Lyndon John & Jonathan Hall (The Royal Society for the Protection of Birds, RSPB)
Terrestrial Ecosystems of the Falklands: a Climate Change Risk Assessment – Rebecca Upson & Colin Clubbe (Royal Botanic Gardens, Kew)
Why do we Red List? – Jeremy Harris (St Helena National Trust)
Using GIS and remote sensing to aid conservation monitoring – Katie Medcalf (Environment Systems), Tony Gent and Thomas Starnes (Amphibian & Reptile Conservation)
<i>OT Biodiversity Data Access Project</i> – Tara Pelembe & Steve Wilkinson (Joint Nature Conservation Committee)
Conserving plant diversity and establishing ecosystem based approaches to the management of forest ecosystems in the British Virgin Islands – Nancy Woodfield Pascoe, Martin Hamilton, Natasha Harrigan, Keith Grant, Ronald Massicott, Denville Hodge, Colin Clubbe, Sara Barrios, Tom Heller, Jean Linsky, Marcella Corcoran (National Parks Trust of the Virgin Islands and Royal Botanic Gardens, Kew)
Boraginaceae <i>Varronia rupicola</i> : conserving a threatened species endemic to the Caribbean – Martin A. Hamilton, Omar Monsegur, Jose Sustache, Jeanine Velez, Nancy Woodfield Pascoe, Natasha Harrigan, Jean Linsky, Marcella Corcoran, Sara Barrios, Tom Heller, Colin Clubbe, Kelly Bradley and Michele Sanchez (Royal Botanic Gardens, Kew)



Chairing & facilitating team (from left): Liz Charter, Mike Pienkowski, Catherine Wensink & Lyndon John

Caicos Pine Recovery Project: an overview – Michele Dani Sanchez¹, Paul Green¹, Sarah Barlow¹, Marcella Corcoran¹, Laura Martinez-Suz¹, Susana Baena¹, Justin Moat¹, Bryan N Manco², Judnel Blaise², Christopher Malumphy³ and Martin A Hamilton¹ (¹ Royal Botanic Gardens Kew, ² TCI Department of Environment and Maritime Affairs (DEMA), ³ Food and Environment Research Agency (FERA))

Species monitoring through a combination of predictive mapping and ground-truthing – Tony Gent, Thomas Starnes (Amphibian & Reptile Conservation) & Katie Medcalf (Environment Systems)

Akrotiri Marsh Restoration: a flagship wetland in the Cyprus SBAs funded by Darwin Plus – Melpo Apostolidou (BirdLife Cyprus)

Discussion

Introduction to session: Conservation action within an international and UK framework

Liz Charter (Isle of Man Government)



Liz Charter

Charter, E. 2015. Introduction to session: Conservation action within an international and UK framework pp 55-62 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

This paper is an introduction to the session on implementing Biodiversity Action Plans in the context of the Environmental Charters, Aichi Targets, and other international conventions. This paper explains these national and international policy drivers, emphasising the value of Biodiversity Action Planning, and ties the various session contributions to these high level objectives. This should help explore how these processes at various levels can help progress conservation.

The Environmental Audit Committee report, “Sustainability in the UK Overseas Territories” was published in 2014. It made strong recommendations for better monitoring, targeted funding, accountability, transparency and good governance. A central recommendation was that the UK needs to extend the Convention on Biological Diversity (CBD) to all its territories (inhabited and uninhabited). We welcome the extension since then to South Georgia & the South Sandwich Islands, and the moves to extend this and other conventions to other territories. In this session we consider how the Forum and its partners can play a role in implementing this recommendation.

What is the point in going through the CBD process... when time is short and finances even scarcer? I believe we can use the CBD/Aichi as the brand label to help sell conservation projects and programmes to both policy makers and funders.

The Isle of Man finally achieved extension of the CBD in 2012. The Manx experience will be shared, both in this summary and in the workshop later in the conference, and suggestions made on how the process can be made easier. There are considerable benefits to governments and NGOs in being tied into the CBD.

Although development and economic imperatives are driving decision-making, Conventions can reinforce the relationship between biodiversity conservation and sustainable development. We have the tools to achieve this, not just the CBD and Environmental Charters, but also other environmental conventions (such as the Ramsar Convention on Wetlands). They all provide the framework for biodiversity conservation.

If embracing the CBD were to be the ambition of the remaining territories, the question remains as to how we help them to do this.

Liz Charter MCIEEM, Principal Biodiversity Officer, Department of Environment, Food and Agriculture, Isle of Man Government liz@iom.com

As Principal Biodiversity Officer for the Isle of Man Government I have become very familiar with parts of this framework, the Multilateral Environmental Conventions (MEAs). Ever since I arrived on the Island in 1998 the question of whether we should request that the CBD be extended to us has been on the agenda. The implications of the various other agreements we are signed up to have been an underlying theme. European legislation has been marginal (as the Isle of Man is outside EU) and Environmental Charters were not required for Crown Dependencies. However they have been recognised as a potentially useful model for the relationship between the Island Government and the UK authorities, although different authorities from those involved in Overseas Territories.

The framework is made up of

- Convention on Biological Diversity (Aichi goals and targets)
- Ramsar Convention on Wetlands
- Convention on Migratory Species (Bonn) and its many agreements, including the Agreement on the Conservation of Albatrosses and Petrels
- Convention on International Trade in Endangered Species (CITES)
- European agreements (eg Aarhus Convention on access to information, public participation in decision making and access to justice in environmental matters).
- Regional Agreements (eg. Cartagena Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region)
- Environmental Charters (arising from the 1999 white paper *Partnership for Progress and Prosperity. Britain and the Overseas Territories*)
- Environmental Audit Committee (EAC) Report *Sustainability in the Overseas Territories* (Published January 8th 2014).

Dominating the framework is the Convention on Biological Diversity and its 2020 Aichi goals and targets. There are now 7 UK Overseas Territories and Crown Dependencies signed up to this agreement (see table of MEAS and Territories). In 2013 the Environmental Audit Committee took evidence from a wide variety of people and organisations including some at this conference. I have selected some of the key recommendations, starting with those relating to funding.

The EAC recognised that adequate funding is critical to effective nature conservation. Paragraph 39: “Investing to prevent biodiversity loss in the UKOTs is a direct and cost effective contribution to meeting the UK’s international commitments under the CBD.” UKOTs are home to at least 517 globally threatened species. The RSPB has called for a more than 10-fold increase in funding (currently round £3m available through Darwin Plus). They estimate this is less than £9,000 per globally threatened species.

The EAC identified 4 funding sources which could be further developed and increased.

- Darwin Plus requires a further step change in funding (Defra action)
- EU LIFE + should be extended to Overseas Territories (Foreign and Commonwealth Office -FCO to lobby Europe)
- EU BEST pilot funding should be built on and made permanent (FCO to lobby Europe)
- Heritage Lottery Funding to be extended to the OTs and OT projects given equal status in assessments (Department of Culture Media and Sport -DCMS action).

There was a recommendation in relation to Environmental Charters, 27: “***Defra must restate its commitment to Environment Charters and use them to deliver its CBD commitments in the UKOTs.***”

The strength of these Charters has been their recognition of the need to address this apparent contradiction. Responsibility for the environment is delegated to the territories and yet the ultimate responsibility for biodiversity in all of the UK and its territories rests with the UK as the Contracting Party to MEAs. The 1999 White Paper *Partnership for progress and prosperity*, identified the need for a new partnership between territory governments and the UK Government. In the area of the natural environment these were laid out in Environmental Charters, signed by both parties (mainly in 2001). These Charters had three sections, guiding principles, the commitments of the UK Government and the commitments of the Territories Governments. There is an example in Annex 1.

The EAC in 2013 recognised the slow progress in extending of the CBD to territories. St Helena, Jersey, British Virgin Islands, Cayman Islands and Gibraltar were included in the original deposition in 1992. The Isle of Man was the next territory to which the CBD was extended in 2012. We in the

Isle of Man understand the obstacles to progress is embracing the CBD. It is a difficult exercise fraught with contradictions. The necessity to identify the explicit obligations when each clause of the Convention is set about with provisos is just one: “Each Contracting Party shall, as far as possible and as appropriate:.....” This is why the more specific goals and targets of Aichi are welcome. However, as DEFRA advises, these “are global targets and do not apply to each Party individually. How each Party chooses to contribute towards meeting the Targets is therefore a matter for it to determine in accordance with its own systems and taking into account its own circumstances. For example coastal states are likely to be able to make a much more significant contribution to the achievement of the coastal and marine component of Target 11; and some Parties will be able to make a more significant contribution than others to achieving (for example) the forestry component of Target 5.”

EAC paragraph 19 . ***“The UK must fulfil its core environmental obligations to the UN under the CBD in order to maintain its international reputation as an environmentally responsible nation state.”***

Correspondingly Territories can enhance their international reputations as environmentally responsible administrations through the extension of the CBD.

“The FCO must agree a timetable to extend ratification of the CBD with all inhabited UKOTs where this has not yet taken place (and immediately extend ratification of the CBD to all uninhabited UKOTs).”

This is expressed in rather blunt language and not the normal tactful approach of Government departments. What was meant was “explore with and encourage territories to develop a joint timetable”. While the UK can dictate to the territories it chooses to be much more diplomatic than this!

It is important to read the Government’s response to the EAC report, which can be found on the same UK Parliament website. This clearly states that there is “no intention of imposing on the Territories obligations that they are ill-equipped to fulfil.” UK government role is to encourage, provide technical assistance and build capacity.

There has been recent progress in extending the CBD to UKOTs. On March 27th 2014, the UK government announced that the CBD had been extended to South Georgia and the South Sandwich

Islands.

How do the Environmental Charter commitments compare with the Aichi targets? It is possible to draw rough parallels between the points in the Charters and the 4 goals and 20 Aichi targets. This has been tabulated by UKOTCF and is presented in the next paper.

The Aichi goals and targets are for achievement by 2020, and already half the decade has passed. Where does this leave territories signing up to and developing biodiversity strategies and action plans now? I will be discussing this and DEFRA’s advice at our “sign up” workshop on Tuesday.

Here are the goals for reference.

Aichi Goals

A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

B: Reduce the direct pressures on biodiversity and promote sustainable use

C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

D: Enhance the benefits to all from biodiversity and ecosystem services

E: Enhance implementation through participatory planning, knowledge management and capacity building

This presentation introduces the framework within which the papers on implementing BAPs and the conference as a whole can be viewed.

Many of the papers which follow address Aichi target 9 (invasive alien species) as well as 19 and 15.

- Rescuing and restoring South Georgia ecosystems by eradication of introduced rats (Tony Martin, South Georgia Heritage Trust)
- Mapping invasive species (Tim Liddiard, States of Jersey)
- Current and planned invasive species removal exercises (Lyndon John and Jonathan Hall, RSPB)
- Caicos pine recovery project – an overview – a poster

Target 9

“By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place

to manage pathways to prevent their introduction and establishment. “

Target 19

“By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.”

Target 15

“By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.”

This Aichi target is reflected in **Environmental Charter Guiding Principle 7** (Control or eradicate invasive species) as well as **Ramsar Strategy 1.9** Invasive alien species (under the Goal for Wise Use); “Encourage Contracting Parties to develop a national inventory of invasive alien species that currently and/or potentially impact the ecological character of wetlands, especially Ramsar sites,... develop guidance and promote procedures and actions to prevent, control or eradicate such species in wetland systems.”

Later in the conference we also have paper on reindeer removal from South Georgia.

EAC paragraph 31 recommended enhanced monitoring, proposing “A comprehensive research programme to catalogue OT biodiversity.” Of course, the cataloguing is only a starting point as most of the papers in this conference bear witness.

Another aspect of this session is information gathering and management.

- Assessing the potential impacts of climate change on native flora of the Falkland Islands (Colin Clubbe, RBG)
- Invertebrate red-listing on St Helena (Jeremy Harris, St Helena NT)
- Monitoring by remote sensing GIS (Katie Medcalf, Environment Systems, Tony Gent and Thomas Starnes, ARC) and POSTER
- OT Biodiversity Data Access Project (Tara Palembe, JNCC)
- Management of forest ecosystems in BVI. POSTER (Nancy Woodfield Pascoe et al, National Parks Trust of VI and RBG)

- Akrotiri Marsh Restoration. POSTER (Melpo Apolostolidou, Birdlife Cyprus)
- Conserving *Varronia rupicola*, a threatened species endemic to the Caribbean. POSTER (Martin Hamilton et al, RBG)

These papers meet Aichi Target 19.

Target 19

“By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.”

Target 15 (restoration): see above

Target 12

“By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.”

Guiding Principle 10

“To study and celebrate our environmental heritage...”

So, for those territories which are contemplating requesting that the CBD be extended, what are the benefits? Participation in the CBD will;

1. establish or confirm an international reputation as an environmentally responsible territory. Increasingly the environmental governance is being bracketed with the social and financial responsibility, within corporations as well as governments.
2. give a framework within which to operate – CBD requires a Biodiversity Strategy and Action Plan (BSAP). I operated according to a plan in my head when establishing the Wildlife and Conservation Office on the Isle of Man. This plan needs to be in the public domain, available to be discussed with partners rather than addressed piecemeal.
3. provide momentum when political will is uncertain. Every territory is subject to changes in politicians and civil servants, restructuring and in the last 5 years financial tightening. It is helpful to refer back to the biodiversity policies which have been agreed in the Strategy
4. enable all to understand the specific biodiversity commitment of a territory and if

necessary hold governments to account. There is no doubt that it is a tool for NGOs and Civil Society to press for action or point to failure to follow policies.

5. assist in obtaining funding by branding projects by their achievement of Aichi targets. Meeting Aichi targets is going to be increasingly valuable in a supporting case for projects, a way of branding the project as relevant to meeting CBD, ie internationally agreed, objectives.

The Isle of Man experience

So how was the Isle of Man's road to Rio? The answer is pretty long and windy. Along the way, the Island has learnt lessons, some of which could be of value to other places. Lesson 1: it can be a slow process. There was a particular meeting which marks the point at which direction was identified and assistance forthcoming. The Crown Dependencies were invited to a meeting at a Defra office in Whitehall on Thursday 29th August 2002. The invitation from the Constitutional Policy Division of the Lord Chancellor's Office was addressed to the Isle of Man's Chief Secretary, and is a beautiful example of the classical way of communicating between governments, sadly no more!

Sir,

I have the honour, by direction of the Lord Chancellor, to refer to previous correspondence concerning the UN Convention on Biological Diversity, which rests with our letter of 30 July 2002.

I am to say that the meeting to discuss the Biological Diversity Convention and other environmental matters will be held at 11 am on Thursday 29 August at the Lord Chancellor's Department, Southside, 105 Victoria Street, London.

I am to ask if Liz Charter will still be attending on behalf of the Isle of Man Government.

I am to enclose a copy of the draft agenda and to enquire if there are any items the Isle of Man Government would wish to be added.

I have the honour to be, Sir

Your obedient servant

Jennifer Schofield

Before my recruitment, in the 1990s, when

there was no full time biodiversity officer in the Department of Agriculture, Fisheries Forestry, as it was then, there had been various attempts to cost the extension of the CBD. But in August 2002, at this Whitehall meeting, Louise Vall of Defra suggested we use the CBD assessment forms and seek the help of the World Conservation Monitoring Centre. Alastair Taylor was duly contracted by WCMC and proved an excellent ally in this process. He objectively gathered evidence of our progress in biodiversity conservation and wrote a report with 10 recommendations. This "article by article" assessment provided the basis of our submission to DEFRA for CBD extension. That document was produced in 2006. Following this, we held a public consultation in 2010 on the CBD, producing a document to explain what the Convention is about and what it would mean to the Island. This was well received and the Minister agreed in early 2011 that we would make the first informal request to Defra to have our assessment evaluated. By this time, there was a supplement to cover the work done since 2006. Defra passed this to JNCC who replied saying they thought it was a good document. Then the UK Government was approached formally through the official channels. Later in 2011, Defra had produced a new proforma for us to complete. I am embarrassed to say we declined as after all this work we just wanted to get the job finished! In spring 2012, we heard that the CBD had been extended to us, as from August 2012.

By this time, we were already well on the way to drafting our first biodiversity strategy (with a drafting sub-group of the Manx Nature Conservation Forum, assisted by Dr Bob Brown who lead the process in Northern Ireland, and sectoral working groups). This was consulted on in autumn of 2013. It was due to go to Tynwald in spring 2014 but a change of Minister delayed this process. We are now on track to take the strategy to Tynwald in the autumn! There is still a Delivery Plan of priority actions to write.

MEA Sign up Workshop

The main points are:

- a) the process of CBD sign up can be lengthy (Isle of Man) or short (South Georgia and South Sandwich Islands),
- b) some consultation is normally required even if few inhabitants,
- c) Civil society plays an important role in generating support for the move, and this will

assist in convincing governments (UKOTCF to assist by putting together benefits of CBD participation)

- d) No need to embrace the Nagoya protocol yet if not required although Cayman has very good example of its positive use
- e) Those signed up to Ramsar were reminded that Ramsar Information Sheets for Ramsar Sites need reviewing every 6 years and there is a new template
- f) CBD has a valuable resource in the NBSAP Forum (www.nbsapforum.net).
- g) Assistance has been offered by UKOTCF, Isle of Man Government, JNCC and RSPB to territories with progressing any MEA work.
- h) The frameworks for MEA work vary, most have Environmental Charters but Montserrat, for example, also has the St George's Framework.
- i) Progress in delivering the Environmental Charters is progress towards meeting CBD's Aichi goals and targets.
- j) It was suggested that all projects should be badged with the appropriate Aichi target(s) to assist in gaining support and funding.

In October 2012, I assisted in a JNCC organised a workshop in Guernsey and assisted Rebecca Kinnesley of Guernsey with a generic guide for small islands on the implications of signing up to the convention on biological diversity, adding a checklist in its annex 3.

DEFRA has indicated that it has changed its views on what is required, and the generic code is likely to be adapted to reflect this. Once complete, this should be a valuable document to small islands in relation to making progress on CBD targets and goals.

The role of the Forum

In 2004, the UKOTCF undertook a valuable review of designated and potential Ramsar sites in the UKOTs and CDs. Eleven new Wetlands of International Importance were (or are being) designated in the UKOTs/CDs during or since this review, and it is still referred to. There is a role for the Forum in the process of evaluating progress and identifying next steps.

The UKOTCF exists to

- promote the coordinated conservation of the diverse and increasingly threatened plant and animal species and natural habitats of the UK

Territories Overseas.

It aims to do this

- by providing assistance in the form of expertise, information and liaison between non-governmental organisations and governments, both in the UK and in the Territories themselves.

Its role in this respect might include

- Help making the case for the strategic approach in the territories and in UK
- Help with the process of having conventions extended
- Lobbying for funding availability and appropriate targeting
- Communication with HMG
- Help with project proposals and grant applications
- Assess progress on the Environmental Charters and Aichi targets.

Conclusions

- There is value both to the territories and the UK government in extending the CBD ratification to the remaining Overseas Territories and Crown Dependencies, while recognizing that this is a choice for the territories.
- The Environmental Charters are part of the existing framework and are a valuable basis for partnership between UK and territory governments. They make the link between the contracting party and the devolved responsibility for environment to governments of the territories. It expresses reciprocity.
- The Charters can be used more effectively to support progress towards CBD sign up.
- The Forum can play a significant role in assisting both territories and UK government in maintaining progress.

Environment Charter

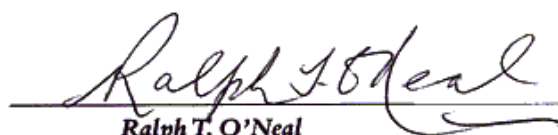
BRITISH VIRGIN ISLANDS



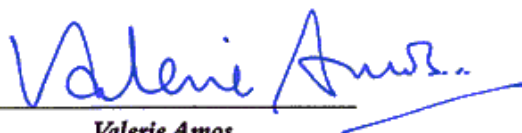
Guiding Principles

*For the UK government, for the government of the British Virgin Islands and
for the people of the British Virgin Islands.*

- 1 To recognise that all people need a healthy environment for their well-being and livelihoods and that all can help to conserve and sustain it.
- 2 To use our natural resources wisely, being fair to present and future generations.
- 3 To identify environmental opportunities, costs and risks in all policies and strategies.
- 4 To seek expert advice and consult openly with interested parties on decisions affecting the environment.
- 5 To aim for solutions which benefit both the environment and development.
- 6 To contribute towards the protection and improvement of the global environment.
- 7 To safeguard and restore native species, habitats and landscape features, and control or eradicate invasive species.
- 8 To encourage activities and technologies that benefit the environment.
- 9 To control pollution, with the polluter paying for prevention or remedies.
- 10 To study and celebrate our environmental heritage as a treasure to share with our children.



Ralph T. O'Neal
BRITISH VIRGIN ISLANDS
26 September 2001



Valerie Amos
UNITED KINGDOM
26 September 2001

Commitments

The government of the UK will:

- 1 Help build capacity to support and implement integrated environmental management which is consistent with the British Virgin Islands' own plans for sustainable development.
- 2 Assist the British Virgin Islands in reviewing and updating environmental legislation.
- 3 Facilitate the extension of the UK's ratification of Multilateral Environmental Agreements of benefit to the British Virgin Islands and which the British Virgin Islands has the capacity to implement.
- 4 Keep the British Virgin Islands informed regarding new developments in relevant Multilateral Environmental Agreements and invite the British Virgin Islands to participate where appropriate in the UK's delegation to international environmental negotiations and conferences.
- 5 Help the British Virgin Islands to ensure it has the legislation, institutional capacity and mechanisms it needs to meet international obligations.
- 6 Promote better cooperation and the sharing of experience and expertise between the British Virgin Islands, other Overseas Territories and small island states and communities which face similar environmental problems.
- 7 Use UK, regional and local expertise to give advice and improve knowledge of technical and scientific issues. This includes regular consultation with interested non-governmental organisations and networks.
- 8 Use the existing Environment Fund for the Overseas Territories, and promote access to other sources of public funding, for projects of lasting benefit to the British Virgin Islands' environment.
- 9 Help the British Virgin Islands identify further funding partners for environmental projects, such as donors, the private sector or non-governmental organisations.
- 10 Recognise the diversity of the challenges facing Overseas Territories in very different socio-economic and geographical situations.
- 11 Abide by the principles set out in the Rio Declaration on Environment and Development (See Annex 2) and work towards meeting International Development Targets on the environment (See Annex 3).

The government of the British Virgin Islands will:

- 1 Bring together government departments, representatives of local industry and commerce, environment and heritage organisations, the Governor's office, individual environmental champions and other community representatives in a forum to formulate a detailed strategy for action. (See Annex 1).
- 2 Ensure the protection and restoration of key habitats, species and landscape features through legislation and appropriate management structures and mechanisms, including a protected areas policy, and attempt the control and eradication of invasive species.
- 3 Ensure that environmental considerations are integrated within social and economic planning processes; promote sustainable patterns of production and consumption within the territory.
- 4 Ensure that environmental impact assessments are undertaken before approving major projects and while developing our growth management strategy.
- 5 Commit to open and consultative decision-making on developments and plans which may affect the environment; ensure that environmental impact assessments include consultation with stakeholders.
- 6 Implement effectively obligations under the Multilateral Environmental Agreements already extended to the British Virgin Islands and work towards the extension of other relevant agreements.
- 7 Review the range, quality and availability of baseline data for natural resources and biodiversity.
- 8 Ensure that legislation and policies reflect the principle that the polluter should pay for prevention or remedies; establish effective monitoring and enforcement mechanisms.
- 9 Encourage teaching within schools to promote the value of our local environment (natural and built) and to explain its role within the regional and global environment.
- 10 Promote publications that spread awareness of the special features of the environment in the British Virgin Islands; promote within the British Virgin Islands the guiding principles set out above.
- 11 Abide by the principles set out in the Rio Declaration on Environment and Development (See Annex 2) and work towards meeting International Development Targets on the environment (See Annex 3).

An overview of progress in implementing the Environment Charters and moving towards the Aichi Targets

Sarah Barnsley, Emma Cary, Mike Pienkowski & Catherine Wensink (UKOTCF)



From top: Catherine Wensink, Emma Cary, Sarah Barnsley, Mike Pienkowski

Barnsley, S., Cary, E., Pienkowski, M. & Wensink C. 2015. An overview of progress in implementing the Environment Charters and moving towards the Aichi Targets pp 63-66 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The Environment Charters arose from the 1999 UK White Paper on Overseas Territories, and address the challenge that UK Government is accountable internationally for multilateral environmental agreements, but responsibility for legislating for these commitments and for implementing the measures is devolved to territory governments. The Environment Charters summarise key points from these international agreements which apply to the territories and list commitments entered into by the territory and supporting ones that UK Government entered into. Most UKOTs signed these agreements with UK Government in September 2001. A few UKOTs and the Crown Dependencies either do not have an Environment Charter or else have one entered into by a different process. Nevertheless, because they summarise existing commitments, the features in the Charters essentially apply to all UKOTs and CDs.

Around the time of the previous two UKOTCF-organised conferences, both the UK Government and Territories asked UKOTCF (which had been involved in facilitating the development and use of the Charters but is not a party to them) to collate information on the implementation of the Charter commitments (whether or not done explicitly relating to the Charters). These collations were published on www.ukotcf.org and remain available. The conferences proved useful as a way of checking and adding to the contents of the collation while many relevant people were gathered together, before producing the final version.

UKOTCF is updating the collation in the period before, during and after this conference. We are trying to make several improvements to the process. First, in order to reduce the work requested of territories, UKOTCF personnel are starting by gathering as much information as possible from existing sources, rather than by questionnaire. Second, we are trying to simplify the final summaries. Third (and we hope not in conflict with the second!), we will try to relate the results to the Aichi Targets as well as to the Environment Charters. (The Aichi Targets – an attempt to put target measures on the commitments of several international conventions – were agreed by the parties since the previous UKOTCF conference.)

UKOTCF will aim to circulate an early draft before the conference, so that participants and others can comment at that stage. We will also try to discuss this with territory personnel in the margins of the conference. All this is intended to be as pain-free a way as possible to produce an update of the situation soon after the conference.

Sarah Barnsley, Conservation Officer & Secretary Southern Oceans Working Group, UKOTCF. conservationx@ukotcf.org
Emma Cary, Conservation Officer & Secretary Europe Territories Working Group, UKOTCF. conservationp@ukotcf.org
Catherine Wensink, Manager & Senior Conservation Officer, UKOTCF. cwensink@ukotcf.org
Dr Mike Pienkowski, Honorary Executive Director, UKOTCF. m@pienkowski.org



Photos: Dr Mike Pienkowski

As I have had a sneaky look at most of the Powerpoints in advance, I can say that the Environment Charters and Aichi Targets feature throughout most if not all of them. This highlights their importance to all of us, and I am pleased to say that some of those that originally developed the Charters are with us here in Gibraltar and can provide fascinating insights which a quick search on Google will not be able to tell you!

Colleagues in the Dutch OTs have commented that the UK Environment Charters are still really important documents which they do not have and which are unlikely to be developed there due to the joint efforts needed to develop something like the Charters.

I will skip really quickly through some of the key events of the past 15 years so that we can get back to where we are now:

- 1999: UK Government White Paper
- 2001: Charters signed by UK and UKOT Governments
- 2002-2006: Strategies developed for TCI & St Helena (UKOTCF facilitating) integrating conservation into economy and social activity continued in the UK Government “mainstreaming” projects (2012 onwards)
- 2004-2005: UK & UKOT Governments asked UKOTCF to collate progress in meeting Charters
- 2009: UK Government publishes UK Overseas Territories Biodiversity Strategy
- In 2010, the Strategic Plan for Biodiversity 2011-2020, and its 20 Aichi Biodiversity Targets, was agreed under the auspices of Convention on Biological Diversity but relating also to other conventions. While reporting on progress in meeting these targets is necessary, equally, practitioners in UKOTs made clear the value of the Environment Charters too.
- In 2012, the UK Government publishes White Paper; although Environment featured strongly it made no reference to the Charters;
- The Biodiversity Strategy review in 2013, this followed a one-day meeting attended by UKOT governments, UK Government and UK based NGOs at Kew.
- In 2014, EAC stated that: The 2012 White Paper claimed to build on the achievements of the 1999 White Paper, but it contained no references to Environment Charters. They recommended that: “Defra must restate its commitment to Environment Charters and use them to deliver its CBD commitments in the UKOTs.” This seemed to be a good way to tie them both together.
- At the request of EAC and with the MPs’ participation, UKOTCF organised a meeting in London on the day of the launch, which involved also UKOT personnel on Skype.
- In 2014, the UK Government submitted its 5th report to the CBD, which included reports from those UKOTs and Crown Dependencies



Photos: Stewart McPherson, Bryan Naqqi Manco, Catherine Wensink

included at the time. These were: British Virgin Islands, Cayman, Gibraltar, St Helena, Ascension and Tristan da Cunha, Isle of Man and Jersey.

During the run up to several other conferences in this series (Jersey 2006 and Cayman 2009) UKOTCF reviewed progress in meeting the Charters. As many of you will know, we have attempted to start another review in the run up to Gibraltar but including the Aichi targets as well.

After some initial attempt to match the Charters to Aichi we found that this was much easier to map the Aichi targets to the Charters and in doing so we ended up with something like the Table, an example of part of which is illustrated at the bottom of the page. Again, many participants will already have seen versions of this and, indeed, helped fill them in.

In addition, this exercise has presented an opportunity to identify some of the gaps in needs in order to meet the commitments and targets. Other sessions in this conference, including the MEA and EIA workshops will also attempt to address some of these points.

Sarah Barnsley and Emma Cary conducted the initial desk review between January and July 2015. We created tables for all the UK Overseas Territories and Crown Dependencies without

prejudice or any assumption made towards those that have not signed up to the CBD or the Environment Charters (but may have equivalents).

We wanted to avoid putting extra loads on our busy colleagues in territories. Therefore, the forms were initially populated by reviewing information already supplied by colleagues from the territories, in earlier surveys, publications, UKOTCF working groups etc. Obviously, we needed to check with territory colleagues the accuracy of our initial collation. Therefore, our voluntary researchers have now begun a period of consultation on the results they have collected. Many of you will have been contacted already. Others will be during this conference, which also provides opportunities for follow up on earlier discussions.

Inevitably there will be gaps and errors – especially in the priorities to be addressed – and we hope that some of you will be able to fill them while you are here or soon after. We will continue the consultations and updating after the conference, with a view to reporting early in the new year.

Some things are already clear. Since the 2009 review, there have been some excellent moves towards meeting the Environment Charter Commitments and, without dwelling on the bad stuff (which I really shouldn't do in one of the opening lectures!), here are some of the highlights.

Environment Charter Commitments by UKOT Governments	Aichi Biodiversity Targets (matched to nearest equivalent Env. Ch commitment)	Summary of progress and the present state	Still to do to meet commitments and other local needs
2. Ensure the protection and restoration of key habitats, species and landscape features through legislation and appropriate management structures and mechanisms, including a protected areas policy, and attempt the control and eradication of invasive species.	5. By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced. (Relates also to EC4)		
2	9. By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.		
2	11. By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well		

Some major achievements in meeting Environment Charters and Aichi Targets

- Ascension's Biodiversity Action Plan
- Cayman's Conservation Law
- South Georgia restoration through rat and reindeer eradication
- Isle of Man fisheries management and protected areas
- Gibraltar's new fisheries regulations
- Pitcairn's proposed Marine Protected Area
- Red-listing for threatened plants and invertebrates

I do not mean to leave anyone out, and we will be able to list more fully in the project's final report, doubtless including many initiatives that we will hear about through the course of the week. This could run to pages and pages!

Some of the gaps identified include (but are not limited to):

- Sign-ups to Multilateral Environmental Agreements;
- Creation of further protected areas including designating Ramsar sites;
- Need for legislation and regulations, and their implementation;
- Resources to increase capacity;

Thank you for your attention, and especially for the help you have already given and that you will be giving in this exercise. The results will of course be made available on www.ukotcf.org.

Meanwhile, we hope you enjoy the rest of the conference .

Last updated: 15/3/2015

Ascension Island Biodiversity Action Plan ASCENSION PARSLEY FERN



Photo: AIC Conservation

SUMMARY

Taxonomy: Kingdom: Plantae; Phylum: Polypodiophyta; Class: Polypodiopsida; Order: Pteridales; Family: Adiantaceae; Species: *Anogramma ascensionis*

Native: Endemic to Ascension Island

Description: Tiny fern with small parsley-like fronds averaging 3-6 cm in height. Grows on moderately dry to wet banks and outcrops on the exposed south-facing slopes of Green Mountain where it is often associated with the native thalloid liverwort *Plagiochasma rupestre* (see photo).

IUCN Red List status: Critically Endangered

Local trend: Unknown

Threats: The major threat to *An. ascensionis* is competition with invasive plant species; secondary threats include landslips and climate change-induced habitat alteration.

Citation: Ascension Island Government (2015) *Anogramma ascensionis* species action plan. In: The Ascension Island Biodiversity Action Plan. Ascension Island Government Conservation Department, Georgetown, Ascension Island.



Photos: Ascension Conservation Department; Tony Martin, SGHT (Rat Bait, South Georgia)

Rodent eradication on South Georgia: global-scale conservation is within the reach of small NGOs

A.R.Martin (University of Dundee and South Georgia Heritage Trust)



Tony Martin

Martin, A.R. 2015. Rodent eradication on South Georgia: global-scale conservation is within the reach of small NGOs. pp 67-70 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Rodents are among the most damaging of all animals introduced by humans to vulnerable island ecosystems, and consequently have been the target of many eradication attempts. As the size of islands successfully freed of rodents increased from hectares to square kilometres, even huge, remote islands like Campbell (113 sq km) and Macquarie (128 sq km) have been tackled, but only Governments are normally prepared to accept the risk and cost of such challenging field operations. Against this background, the decision, almost a decade ago, of a small Scottish charity to eradicate rats from South Georgia, an island 33 times larger than any previously tackled, was bold and ambitious. The South Georgia Heritage Trust (SGHT) had no previous experience of eradications, but a determination to find the resources and expertise to prevail. In partnership with the University of Dundee, and after assembling an international team of fieldworkers and buying helicopters, SGHT's project commenced fieldwork in 2011 following several years of planning and preparation. Sub-Antarctic South Georgia is riven by glaciers which form impenetrable barriers to rodents, so the operation could crucially be divided into three phases, each separated by two years to allow time to raise money for the next field season and to improve techniques by learning from experience. The final area of land was treated in late March 2015. A survey in three years will determine if the operation has been successful, but encouragement is provided by the fact that the Phase 1 area (128 km²) now appears to be free of rodents. The conclusion of the South Georgia baiting work demonstrates that even large-scale pest eradications are within the capability of NGOs with vision and determination. This offers real hope for hundreds of island ecosystems damaged by invasive species worldwide.

Prof. Tony Martin. University of Dundee and South Georgia Heritage Trust.
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The human world is belatedly realising that our transportation of living organisms from where they evolved to somewhere new can have catastrophic consequences. The cost of introducing alien organisms can often be measured in terms of money - sometimes eye-watering amounts of money - but also in terms of something more permanent - the extinction of other, native organisms. The list of species lost to alien invasions is long, and of course the impact of aliens is especially profound on islands, where many animals and plants evolved precisely because of the lack of competitors, predators and parasites normally found on larger land masses.

By the time a problem caused by an invasive alien

species (IAS) has been identified, the invader is normally well-established and widespread. Removal is usually not then possible, by virtue of financial cost, lack of practical means of eradication, lack of will to do the work or even a resistance to the eradication itself on the part of some people. Even when eradication would be widely welcomed and a means is available, the cost and complexity of the necessary operation is often such that only governments and a handful of the very largest charitable trusts and foundations worldwide will consider carrying them out. The fact that so few governments are willing and able to undertake this role means that most invasive species will remain in place for a very long time,



The project's three helicopters being transported on the British Antarctic Survey's ship Ernest Shackleton (left) and reassembled on South Georgia (right)

no matter the irreversible damage they cause. Meanwhile, more species are lost forever, more habitats are rendered inhospitable and, incredibly, more IAS are being introduced to more places, making the problem even worse than it was.

In such a depressing landscape, it is heartening that a fightback has started and is rapidly growing, with hundreds of IAS eradication operations having been carried out over recent decades. Early pioneering work on islands or land areas of a few hectares proved that invasive species really could be entirely removed, and the scale of ambition has increased year on year as lessons have been learned, confidence has increased, and the ecological benefits of success have become more widely recognised.

Although many different native organisms have benefited from the eradication of IAS, much of the publicity, effort and money has focussed on operations that are intended to save island-dwelling birds from introduced predators. Though arguably no more deserving than amphibians, mammals, reptiles, insects or plants, birds tend to capture the public imagination and generate interest in, and support for, 'doing something' about their future. Such backing is vital, not least because of the financial cost involved in any significant eradication operation. Decision makers, whether in the public or private domain, usually need to see evidence of widespread support before committing the very substantial monies required to eradicate a pest species, especially when there are strong competing pressures for the money to be spent on other things more widely perceived to be deserving of the funds.

The cost of any large scale eradication operation is normally measured in the millions of pounds/dollars. This has meant that large-scale eradications were only attempted on islands within a very few

countries with enlightened governments (e.g. New Zealand and Australia) or those selected for priority consideration by the world's largest environmental charities and foundations (e.g. RSPB and Galapagos Conservancy).

Until now, that is. The subject of my presentation is an eradication operation on a vast scale, and one that was conceived, organised and funded by a small UK charity. As such, the South Georgia Habitat Restoration Project, costing £7.5m over four seasons of fieldwork (three baiting and one survey) involving the eradication of rodents from more than 1000 square kilometres of sub-Antarctic wilderness, breaks the mould. With primary fieldwork completed in March 2015, and with an impeccable safety record and no budget overspend, this project demonstrates that globally important conservation work need not be the preserve of governments and only the largest charities.

The South Georgia Heritage Trust (SGHT) was formed in 2005, with just seven trustees who had a keen interest in the future of the 170km long sub-Antarctic island - an Overseas Territory of the UK. In 2007, and with no experience of such work, the trustees made a decision to raise the money necessary to eradicate rodents from South Georgia - rodents that had been introduced by sealers and whalers after the island's discovery by Capt. Cook in 1775. In the nearly 2½ centuries since then, brown rats had eaten their way through countless millions of birds, eliminated burrow-nesting seabirds from much of the main island and banished the endemic pipit to small offshore islands. The dream was to remove every rodent and allow South Georgia's native wildlife to reclaim the vast areas of the best habitat from which it had been banished; in effect, rolling back two centuries of damage unwittingly caused by Man. On an island the size of South Georgia, and where rodents could occur from sea-level up to the



Helicopter carrying bait distribution hopper over camp (left) and hopper being re-filled (right)

margins of permanent ice at elevations of over a thousand metres, the only possible way to achieve the goal was by using helicopters to spread toxic bait pellets sparsely over every piece of land where rats and mice could feasibly live. To leave even one pregnant female, or a male and a female, alive anywhere on this vast island could result in failure.

After an unsuccessful attempt to outsource the management of the project, SGHT eventually took the remarkable step of managing the operation in-house, setting up a Steering Committee and appointing a Project Director in collaboration with the University of Dundee. This hugely ambitious leap into uncharted waters grew to be overwhelmingly the Trust's major occupation, resulting in the recruitment of fund-raising and fieldwork staff and the purchase and management of a fleet of three helicopters.

With no membership to provide support, the raising of the necessary funds was a huge challenge. Ten percent was secured from the UK Government's DEFRA, including two successful bids for Darwin Initiative and Darwin Plus support, but 90% was (and is still being) raised from private individuals, charitable trusts and foundations, and business. A sister US organisation - the Friends of South Georgia Island (FOSGI) - was set up during the project and has contributed a substantial proportion of the total. We have learned that people are often keen to support a habitat restoration project - to help reverse the damage caused by humans and to get rid of a pest species almost universally disliked. The money is out there; the key is to find potential donors and to have a well-researched, well-organised project which they judge to have a good chance of success and make good use of their donations.

South Georgia is so large that it would have been impossible to treat the whole island in one season, given that the bait would have to be spread outwith

the summer period in order to reduce as far as possible the exposure of birds to the toxic bait. Many species are migratory, and would leave the island before baiting took place if the operation was delayed until autumn. If South Georgia had the same characteristics as the other islands that had been treated for rodents, the operation would not have been possible - rodents from untreated land would have moved into the cleared area between seasons. But South Georgia is not like any other rodent-infested island. It is riven by glaciers that terminate in the sea - glaciers that form an impenetrable barrier to rodents and effectively transform South Georgia into an island of islands. Although the glaciers are retreating at a remarkable rate due to global climate change, there remained an opportunity to carry out the eradication work over several seasons, secure in the knowledge that a cleared area would not be re-invaded between seasons. The decision was made to do the work over three expeditions, each separated by two years to allow evaluation of the work and time for fund-raising.

A trial field operation was mounted in 2011, when an area of land amounting to 128 km² was spread with rodenticide bait. Although only 12½% of South Georgia's rodent-infested land, this Phase 1 target was equal in size to the largest island previously treated for rodents - Australia's Macquarie island. Monitoring over the following 12 months demonstrated that the baiting methodology seemed to have been effective, and that non-target mortality (the accidental but sadly unavoidable poisoning of birds) was sustainable and recoverable. Consequently, the decision was made to proceed with Phase 2 in 2013, this time aiming to cover a monumental 580 km². This ambitious task was almost thwarted by long spells of diabolical weather, but eventually, after many months on the island and in severe sub-zero temperatures, the final load of bait was spread



Helicopter over König Glacier (left) and approaching Iris Bay (right)

successfully. Two years later, in January 2015, Team Rat returned to South Georgia in order to bait the southern portion of the island - an area of 360 km² - and, on 23 March 2015, the job was completed. The task of placing at least one bait pellet (a fatal dose) into the path of every single rodent on the island had taken three seasons, 1000 flying hours, 300 tonnes of bait, 900 drums of aviation fuel, 13 person years in the field and a total spend of some £7m.

It is too early to know whether the eradication effort has succeeded. The signs are good, and the 2011 Phase 1 area has been declared rodent-free, but we must wait a further two years before carrying out a comprehensive survey to check whether the land treated in 2013 and 2015 is similarly free of rats and mice. However, we can already conclude that the methodology was fundamentally sound, that SGHT has carried out an operation as competently as any larger organisation could have done, and that the project to date has been very cost-effective compared to its predecessors elsewhere. One advantage of a small NGO is that it is not beset by layers of bureaucracy; its operations can be lean and mean!

The successful conclusion of baiting fieldwork on South Georgia earlier this year was of course a milestone for the island and its wildlife. But perhaps the most important legacy of this project on a broader scale will not be the operation itself, but the manner in which it was conceived and carried out, hopefully providing encouragement and inspiration for others. South Georgia demonstrates that even the very largest of alien eradication operations can be undertaken by small charities with the vision and determination to make a significant difference in their own part of the world. Currently the rate of loss of native wildlife from islands due to alien introductions exceeds the rate at which those aliens are being removed. More

native species will disappear unless eradication capacity is increased, but governments and large NGOs are simply unable to tackle more than a small fraction of the islands needing help. The rest of us can and must do more to prevent further extinctions and restore fragile island ecosystems to their original glory.

Mapping invasive Japanese knotweed in Jersey, Channel Islands

Tim Liddiard (States of Jersey)



Tim Liddiard

Liddiard, T. 2015. Mapping invasive Japanese knotweed in Jersey, Channel Islands. pp 71-74 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

In response to local environmental degradation/impacts and the requirements as set out in various Multi-Lateral Environmental Agreements to address the impact of Invasive non-native species, Jersey has started a project using citizen science techniques with the Islands population.

Due to our lack of an invasive species strategy, the lack of co-ordination in the past in recording locations and efforts to control individual species resulted in a rather haphazard approach resulting in a complicated paper trail of databases, spreadsheets.

For several years we have been assigning our knowledge on Japanese knotweed *Fallopia japonica* locations to planning applications being screened in an attempt to limit its dispersal caused by developments.

In 2013, the Environment Department initiated a project to gather data on the locations of Japanese knotweed. This plant was selected as a good target species due to its relative ease in identification, its high profile and the threat it poses to Jersey's infrastructure and biodiversity. By downloading a phone app designed by Plant Tracker (<http://planttracker.naturelocator.org/>), people in Jersey have been engaged via the media and on our website (www.gov.je) and asked to photograph then email any sightings of this plant to the plant tracker website. These sightings are then downloaded by DoE from the plant tracker website and the locations, together with any information are recorded on a GIS layer. They are then ground truthed by staff (and by a local company who have applied for funding through an Agri-environment scheme). All records have been verified and added to historic records held at the Environment Department which has led to an increase in records from 50 to 120.

After the records have been verified the project aims to assign criteria to all patches of Japanese knotweed including proximity to water courses and roadsides, which will in turn prioritise their management, identify land ownership details and calculate the known infested area and costs of control.

This has been a very successful way of gaining information about the plant's occurrence in the wild, and the Department have been working with plant tracker to add Pampas grass *Cortaderia selloana* to the list of plants on the plant tracker website as we are very concerned about the current spread of this plant, but have very few records of its occurrence. We expect to develop a database on *C. selloana* and aim to manage this species in a similar way.

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Japanese knotweed

Jersey sits in the Bay of St Malo, just 19 miles (30.5 km) from the French coast and 85 miles (137 km) south of the English coast. Jersey is the biggest of the Channel Islands. It is made up of 12 parishes and has a population of 99,000. Jersey is only 5 miles (8 km) long and 9 miles (14.5 km) wide.

Jersey's southerly location and sheltered position in the Bay of St Malo mean that we have a generally temperate climate that is often warmer, with more sunshine hours, than you might experience in the other British Isles.

In recent years, the problem of alien species affecting Jersey has increased substantially, with common garden plants such as pampas grass *Cortedaria selloana* starting to produce viable seed and becoming established in new areas, and the arrival in Jersey of pest species such as the oak processionary moth *Thaumetopoea processioneae* and the gypsy moth *Lymantria dispar*, both capable of significant damage to tree species through defoliation and, in the case of the oak processionary moth, also a significant risk to human health. These species have all had an economic impact upon the Island as resources are necessarily diverted into dealing with the problem.

Japanese knotweed is a tall, vigorously growing, perennial plant which originates from Japan and was brought to Europe as an ornamental and fodder plant in the early 19th century. Now regarded by some as the most invasive plant in Britain, and by the World Conservation Union as one of the world's 100 worst invasive species, Japanese knotweed can colonize most habitats and it has become widely established throughout the British Isles, capable of smothering entire areas and dominating all other plant life. Over £100m is spent annually on Japanese knotweed control in the UK

Currently the States of Jersey deals with invasive species, including disease organisms, in various ways, through a number of laws, administered by differing departments (these Laws include the Plant Health (Jersey) Law 2003, Waste Management (Jersey) Law 2005, Weeds (Jersey) Law 1961, Conservation of Wildlife (Jersey) Law 2000 and Disease of Animals (Importation of Miscellaneous Goods) (Jersey) Order 1958).

A co-ordinated Strategy unifying the above Laws to deal with problem species is scheduled for completion but various pressures on resources have resulted in the project's priority being lowered.



Japanese knotweed location points on aerial image

It was first recorded in Jersey before 1915, and it has since appeared in many areas around the Island.

Climate change, changing gardening fashions (e.g. the current demand for ornamental grasses), the increased popularity, and ease of keeping, of exotic pets, changing crops and the increase in areas from which plants and plant products are imported will all play a part in the increasing problem of invasive species.

Education is a key strategy for all those involved in land management, including States Departments, gardeners and the general public who may harbour these species on private land. For importers of plant material and animals, such as nurseries, garden centres and pet shops, as well as pet keepers, a raised awareness of the problems will assist in reducing the harm caused and in reducing future threats.

There are many ways in which foreign species can arrive in Jersey. Our geographical location, and the Island's diverse semi-natural habitats and its economic and social structure, requiring a transient population and a large proportion of goods to be imported, provide many opportunities for species to become established here, intentionally and accidentally. Food-stuffs and plant material arrive here from globally diverse destinations, winds can carry insects and plant propagules from the continent, tourism and industry bring people from

various countries and the trade in garden plants and exotic pets is vigorous.

In an effort to control the spread of non-native invasive plant species in the Island, a project was started in 2013 which combines the harnessing of public knowledge and mobile technology in order to better understand the risk being posed by one plant which is already known to be a major threat.

The Biological Records Centre (BRC), established in 1964, is a national focus in the UK for terrestrial and freshwater species recording. BRC works closely with the voluntary recording community, principally through support of national recording schemes and societies. BRC is supported by the Joint Nature Conservation Committee and the Centre for Ecology & Hydrology.

BRC supports recording using mobile apps. They will make it easier for more people to join in. By using GPS, camera, clock, and mobile network, we expect to see more records that are more accurate.

The I Record website is a Biological Records Centre project that allows anyone, anywhere in the UK, to submit records of any species. Records are checked by a panel of experts and made available to local record centres and national schemes and societies, as well as contributing to the research of BRC.

The ability to make records using mobile technology is provided via the PlantTracker app.

By downloading the Plant Tracker app, people in Jersey have been engaged via the media and asked to record any sightings of this plant. A variety of quality assurances are put in place, including automated checks by I Record, the host website. These sightings are then received by us in Jersey for verification and added to historic records held at the Environment Department.

This negates the problem of data quality which was considered to be a major issue. The ease of plant identification will probably be a limiting factor as the project evolves. A point to note is that the verifier needs to be able to confirm a record from photos, which on occasion are not very clear. Pampas grass has, in recent years, become more vigorous and can now be found seeding in most coastal and inland habitats. After working with PlantTracker we requested the inclusion of pampas grass on their website as it is not yet considered as a problem in mainland Britain.

A total of 239 public Japanese knotweed records have so far been received, some of which replicated the 126 historic records already held, but also added a number of new locations for the plant.

The Jersey Department of the Environment has liaised with the Great Britain non-native species secretariat who are interested in Jersey being an early warning system for potential invasives in mainland Britain.

The need for assessing a priority to each patch has been highlighted and the Countryside Enhancement Scheme, Jersey's agri-environment scheme, has helped fund a local consultant to survey each patch over the summer 2015 to assess each individual patch following set criteria being prepared by the Environment Department.

In the absence of individual patch assessment, the records can still be used to inform planning applications and targets requirements and conditions to be placed on planning permits at properties where Japanese knotweed is known to be found.

Meetings are currently taking place between the Natural Environment Team and the Agricultural Inspectorate to identify any existing legislation or policy which could easily be amended so that the onus of control can be placed with the landowner and not local Government.

Private landowners are often surprised to hear that there is no statutory requirement to deal with knotweed infestations, especially when on their neighbour's property.

In our experience, any Japanese knotweed found on public land is relatively simple to control and does not have a major impact on the rangers work schedule, but it would have if they were to deal with the problem Island-wide. Local spread is likely to be caused by roadside cutting or soil movement. For this reason we are keen to provide alternatives and are exploring offering either incentives or a legal requirement for landowners to deal with any Japanese knotweed found on their land.

Current and planned invasive species removal exercises

Lyndon John & Jonathan Hall (The Royal Society for the Protection of Birds (RSPB))



Lyndon John



Jonathan Hall

John, L. & Hall, J. 2015. Current and planned invasive species removal exercises. pp 75-76 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Invasive Alien Species (IAS) have been identified as one of the leading threats to global biodiversity recognized under the Convention on Biological Diversity (Article 8(h)). The impacts of IAS have been particularly significant for small islands globally, including those of the Caribbean UK Overseas Territories (UKOTs). Therefore, efforts at IAS control or eradication have become mainstream conservation management options. In the study “Prioritizing islands for the eradication of invasive vertebrates in the United Kingdom overseas territories” (Dawson. J. *et.al*, 2014), the authors devised an approach that seeks to decide which islands have the highest priority for eradication as this is of strategic importance to determining the allocation of limited resources to achieve maximum conservation benefit. The study examined eradication feasibility and distinguishes between the potential and realistic conservation value of an eradication. They identified the top 25 priority islands for invasive species eradication that together would benefit extant populations of 155 native species, including 45 globally threatened species. The five most valuable islands included the two World Heritage islands Gough (South Atlantic) and Henderson (South Pacific) that feature unique seabird colonies, and Anegada, Little Cayman, and Guana Island in the Caribbean that feature a unique reptile fauna. The RSPB is currently leading work aiming towards the restoration of Gough and Henderson Islands via aerial eradication of their introduced mouse and rat populations. Other Caribbean UKOTs recognised in the study are offshore islands and cays of Anguilla, British Virgin Islands and Turks & Caicos Islands.

Conserving Species and Sites of International Importance by the Eradication of Invasive Alien Species in the Caribbean UK Overseas Territories is a three-year project funded by the BEST Instrument^A. This project was designed to develop capacity in the Caribbean UKOTs to manage invasive species that are impacting on key biodiversity sites and endangered species. The work is led by the RSPB in partnership with organisations from five Caribbean Territories: National Parks Trust of the Virgin Islands BVINPT, Jost Van Dyke Preservation Society JVDPS, Anguilla National Trust ANT, Department of the Environment in the Ministry of Agriculture, Land, Housing & the Environment, Montserrat (DOE), Turks and Caicos National Trust (TCNT), National Trust for the Cayman Islands (NTCI). Additional technical support is provided by Animal and Plant Health Agency (APHA) based in the UK. Activities undertaken under the project include assessment and feasibility studies for eradication or control of IAS. In the Turks and Caicos Islands, rodents and cats have been identified as a problem for the critically endangered rock iguanas on Little Water Cay. In the Cayman Islands where the common iguana has become invasive the project sought to: 1) provide a recommended methodology for the detection of iguanas and the trapping, removal or culling of iguanas; and 2) provide a technical document to local partners to improve biosecurity to reduce the risk of introduction of common iguanas to Cayman Brac and Little Cayman from Grand Cayman. Eradication exercises have been undertaken in the British Virgin Islands on Little Tobago, Great Tobago, and Green Cay where goats threaten the habitat of nesting seabirds. In Montserrat, feral livestock control in the Centre Hills Forest Reserve has been undertaken in partnership with the DOE and camera traps are deployed into the Centre Hills to track movement of feral livestock.

^A The voluntary scheme for Biodiversity and Ecosystem Services in Territories of the EU Outermost Regions and Overseas Countries and Territories (BEST Initiative). BEST seeks to promote the conservation of biodiversity and the sustainable use of ecosystem services including ecosystem-based approaches to climate change adaptation and mitigation in the EU outermost regions and overseas countries and territories.

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Common green iguana © Lyndon John



Common green iguanas, Cayman Island © Y J Millet



Masked booby, Dog Island, Anguilla © Lyndon John



*Feral cat with semipalmated sandpiper
© Alistair Homer*

(The authors have opted to publish this extended abstract, rather than a full paper,)

Terrestrial Ecosystems of the Falklands – a Climate Change Risk Assessment

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Colin Clubbe

Upson, R., McAdam, J. & Clubbe, C. 2015. Terrestrial Ecosystems of the Falklands – a Climate Change Risk Assessment. pp 77-82 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The Falkland Islands are predicted to experience an up to 2.2°C rise in mean annual temperature over the coming century, greater than four times the rate of warming experienced in the last 100 years. In order to conserve effectively native plants, the habitats they form and the services they provide in the face of this changing climate, the current project carried out a climate change risk assessment for the terrestrial environment of the Falkland Islands, focusing on plants and soils and the services they provide. We highlight the results of targeted research, such as species distribution modelling and soil carbon estimation, which have fed directly into the climate change risk assessment. The results of this risk assessment will be presented and their planned use, in providing the basis of a National Climate Change Action Plan, discussed.

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Introduction

The TEFRA project - “Terrestrial Ecosystems of the Falklands – a climate change risk assessment” is a collaborative project between the Royal Botanic Gardens Kew, the UK Falkland Islands Trust, Falkland Islands Government, Falklands Conservation and the Falkland Islands Department of Natural Resources (Kew 2015). The project is funded by the European Union under the BEST Initiative (BEST 2015) and runs until the end of 2016.

This paper provides an overview of the main phases of the project – targeted research, risk assessment and action plan – and provides examples of results generated so far. The overarching aim of the project is to assess the potential impacts of climate change on the terrestrial environment of the Falkland Islands, based on our current level of knowledge. We then aim to assess if and how we can mitigate against these potential impacts.

Climate change is one of the major challenges facing the world (Millennium Ecosystem Assessment 2005; IPCC 2014). It places an additional stress on ecosystems at a time when many are already under pressure. Island floras are particularly vulnerable to the impacts of climate change (Thomas *et al.* 2004; Bramwell, 2011; Maclean & Wilson 2011) and therefore understanding the likely responses is an urgent, if challenging, scientific problem.

This project was planned on the basis of weather data and appropriate regional climate models now being available for the first climate predictions for the Falkland Islands to be produced.

Given that plants and soils form the basis of all habitats and the basis of livestock farming, the main land-use across the Falklands, our project focuses on the impacts of climate change on these elements of terrestrial ecosystems.

Figure 1 presents a schematic overview of the project. The starting point was to facilitate climate

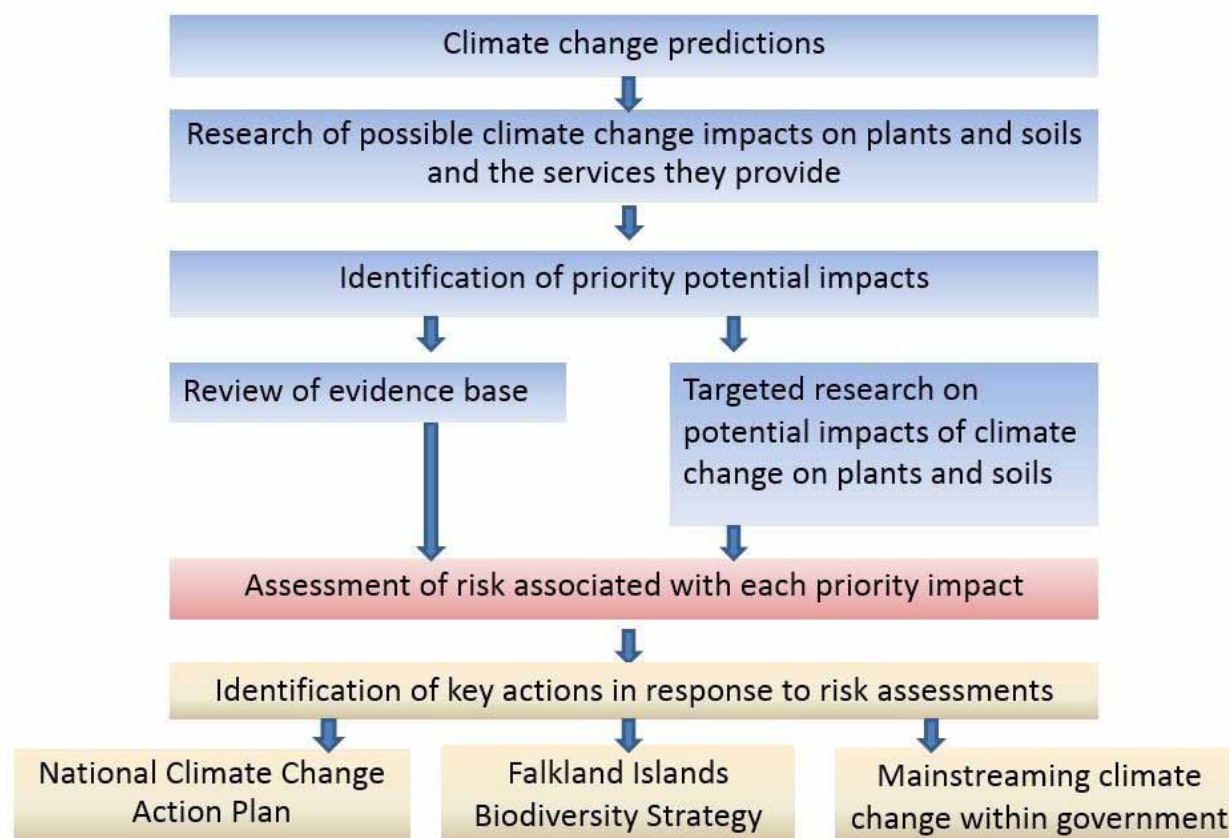


Figure 1. Schematic overview of the project

change predictions to be undertaken by the Climate Change Research Unit at the University of East Anglia. With these predictions, we were then able to research possible climate change impacts on the plants and soils of the Falklands and the services they provide. With this list produced, we then organised a workshop in the Falkland Islands to identify which of the possible climate change impacts are the highest priority locally. From this priority list we assessed which it was possible for us to address within the scope of the current project – either through our own targeted research or by literature review or a combination. This allowed us to produce a qualitative assessment of the risks associated with each priority impact – this assessment has now been sent out for final review, and so this is the stage we are currently at. The next phase is to build on our initial consultations, based on the first review of the risk assessment, to identify key actions that can begin to address the main risks identified. Alongside this we are identifying the best ways of embedding these identified actions into policy.

The methodology adopted was based upon, and adapted from, the 2012 UK Climate Change Risk Assessment process (UK Government 2012) and in particular the technical report for the Biodiversity and Ecosystem Services Sector (Brown *et al.* 2012).

Potential Impacts of Climate Change

The team at the Climate Change Research Unit at UEA used available regional climate models alongside local weather data spanning the last century, to predict climate change trends across the Falkland Islands. An increase in mean annual temperature of up to 2.2 degrees by 2100 (Figure 2) is predicted – this is a dramatic increase on the last century which has seen an increase of 0.5 degrees in the mean annual temperature (Lister & Jones 2014; Jones *et al.* 2013).

In contrast, no change is predicted in the mean annual precipitation, although predictions for rainfall are inherently more difficult (Figure 2). It is likely that the pattern of rainfall across the year will be impacted if not the total annual precipitation. For example the last century of weather records indicate a significant increase in summer sunshine which suggests increased drought periods during this time (Lister & Jones 2014; Jones *et al.* 2013).

There are many potential impacts of climate change on the land of the Falkland Islands. We therefore organised a workshop in May 2014 to find out which are the highest priority locally in the Falkland Islands. In producing a score for each potential impact, we asked workshop

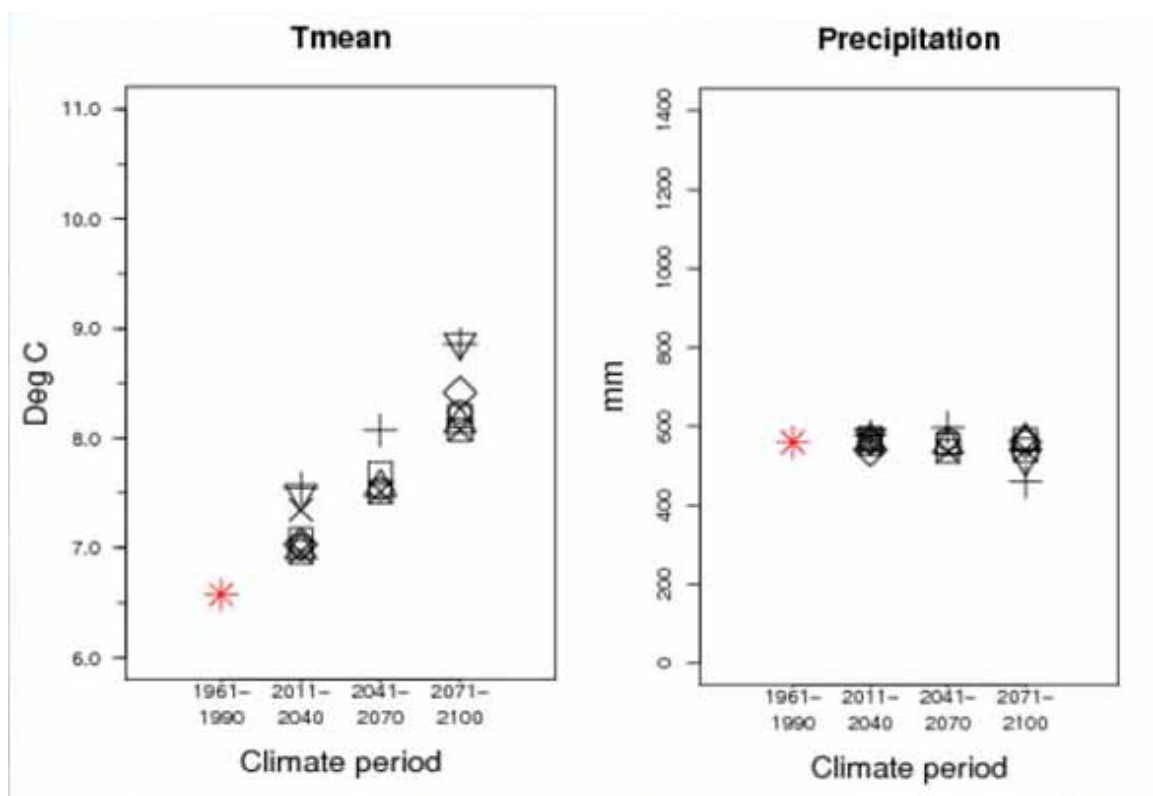


Figure 2. Climate change predictions

participants to consider the potential loss or gain of biodiversity for any given impact, the potential effect on the health and functioning of terrestrial habitats and also to consider how urgent it is to address a particular impact.

We are focusing on five potential impacts of climate change, identified as within the top ten priorities locally. We have carried out targeted research as well as referring to external expert opinion and the scientific literature available and carrying out reviews of this.

The priority climate change impacts for the flora of the Falkland Islands were identified as the potential for:

- Increased soil moisture deficits and erosion – according to local observations, 7-15 cm of soil are lost annually in some areas of the Falkland Islands already; worryingly an increase in soil moisture deficits caused by increased temperature has the potential to increase this rate
- Changes in the level of invasiveness of introduced plant species and potential changes to the array of plant pests and diseases that can establish
- Changes in the distribution of the native flora
- Habitat disturbance by an increase in the frequency of high intensity weather events – we focus on the possibility of increased wildfire occurrence

- Changes in soil carbon content.

This paper will highlight several interesting findings related to two of these: changes in the distribution of native flora; and changes in the level of invasiveness of introduced plant species.

Changes in the Distribution of Native Flora

The main approach we took to investigate potential impacts of climate change on the distribution of the native flora was to carry out species distribution modelling (Figure 3). Our starting point was the species presence data and associated environmental data – including the mapped climate scenarios as well as a range of relevant non-climate variables. We used these data to investigate the relationships between each species' distribution and its environment – this included assessing species response curves to different variables and also investigating the importance of each variable to model predictions. For each species, we selected those models that best predict the current distribution and combined them into an ensemble model to provide a consensus forecast and better predict both the area of suitable environmental space under present day climatic conditions and also under future scenarios. We used the predictive species distribution modelling package called BIOMOD2 than runs through R software (R 2015).

One of our target species is the cushion plant *Azorella selago* Hook.f. (Figure 4). This species is

Changes in the ranges of native plants: Schematic representation of modelling process

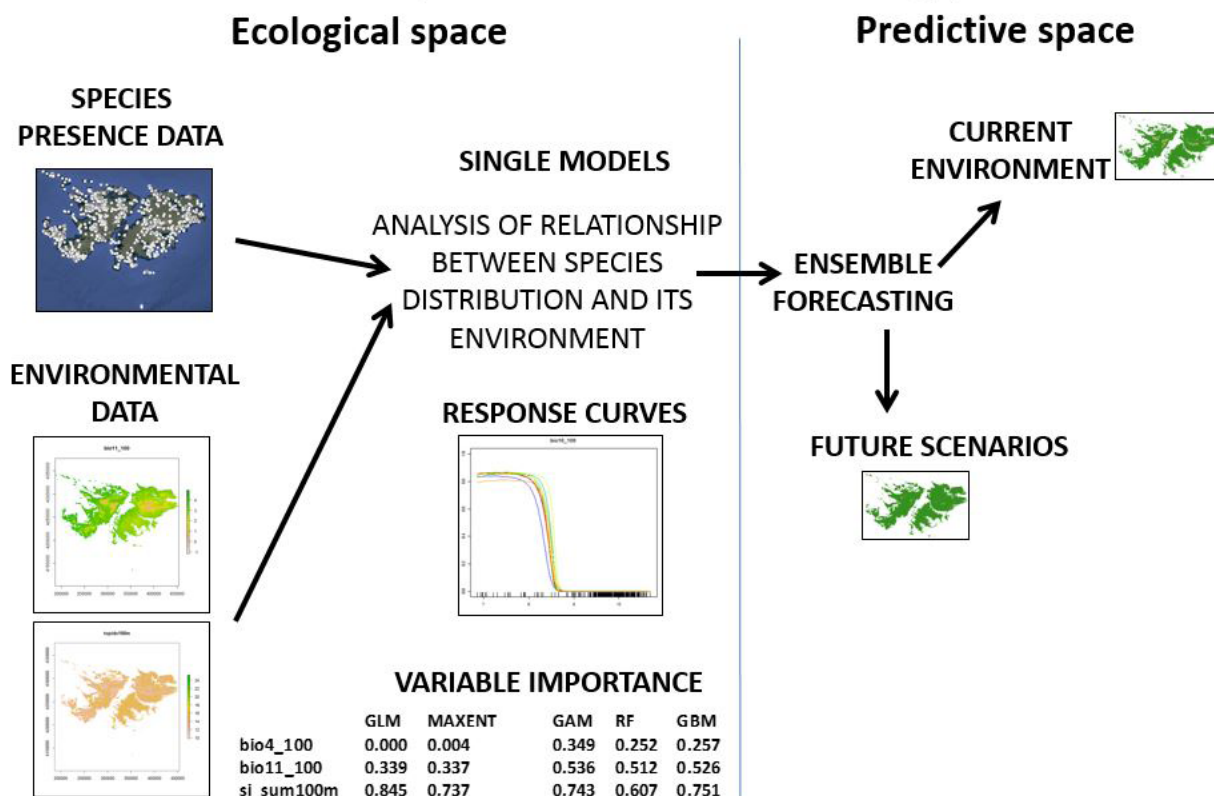


Figure 3. Species distribution modelling

restricted to upland areas and is found in cushion heath such the upper slopes of Mt Usbourne on East Falkland (Figure 5). Beyond the Falkland Islands, it occurs in the sub-Antarctic and at the very southernmost part of South America in alpine regions.

We produced a habitat suitability map for this species showing which areas are predicted to be environmentally suitable for *Azorella selago* under today's climate and this encompasses all of its known populations. We then produced a mean presence-absence map, based on our five regional climate ensemble model predictions for 2071-

2100. Our results predict huge decreases in the amount of suitable environmental space for this upland species with the majority of areas currently suitable being lost by 2080. The results show that the decline is almost completely through range contraction rather than range shift. This is in line with our expectations as this species effectively has nowhere to go as warming occurs.

Overall, our modelling work demonstrates for the first time that predicted temperature increases for the next century are likely to have significant negative impacts on the flora of the Falkland Islands. Our research indicates predicted range



Figure 4. *Azorella selago* habit



Fig 5. Upland Cushion Heath Habitat

contractions for those species restricted to upland areas of the Falkland Islands and so acts as a persuasive case for better monitoring, management and protection of upland areas. Potential refugia areas for upland species have been identified. However, in the long term we found that none of these overlap with sites currently known to support populations of *Azorella selago*.

There is a group of species restricted to the milder west of the archipelago that are predicted to be amongst those species that could benefit from a warmer climate.

Overall the variations in the magnitude of predicted range changes indicate that climate change will alter the structure of Falkland plant communities as different species within a given community are predicted to react in different ways.

Invasive Species

Isolated islands with restricted floras such as the Falklands are highly vulnerable to the impacts of non-native organisms (Kiehn 2011).

One of the case studies we considered in light of climate change was that of the invasive shrub *Berberis microphylla* G.Forst., known locally as calafate (Figure 6). This is a species native to Chile and Argentina and it is still in the process of expanding its range in the Falkland Islands. We have produced a map showing all the known localities for this species, along with predictions for the potential spread over the next 70-year period based on spread rates between 1944 and 2009 at one farm on East Falkland.

The locations where it occurs are largely a result of spread from planted individuals – so we felt it more appropriate to model its potential spread based on its distribution in the native range. We established a collaboration with a researcher



Figure 6. Invasive *Berberis microphylla* habit

in Chile, Patricio Plissock, who is based at the Universidad de Chile in Santiago, and obtained botanical records for *B. microphylla* from three different herbaria within Chile. This has given us reasonable coverage across the latitudinal, if not longitudinal, range of this species. Applying the ensemble distribution model developed for Chile to the Falkland Islands shows that we can expect the majority of the Falkland Islands to hold a suitable climate for calafate. At present, higher altitude areas are at less risk from invasion but this is likely to change under the warming predicted.

This study offers a further warning that calafate is a species that urgently needs eradication before it becomes even more of a problem in the future.

Climate Change Risk Assessment

We have now carried out a qualitative assessment of the risk associated with each priority climate change impact, based on the available evidence. These assessments have allowed us to provide summary statements for each potential climate change impact which will then be reviewed by the Falkland Islands Government. This review process has already begun with a summary of potential climate change impacts on biodiversity having been fed into the May 2015 Falkland Islands Biodiversity Strategy Review. The follow-up on this is currently underway.

The final phase of the project is to work collaboratively with the Falkland Islands Government to identify what actions should be taken to address the priority impacts, bearing in mind those that pose the greatest identifiable risks.

In addition to feeding into the Biodiversity Strategy review, this may take the form of a separate Action Plan document alongside strategies to mainstream climate change within national policy decision-making

Why is this important?

- To make the best use of limited resources that are available
- To build in resilience and resistance to climate change

Conclusions and Wider Implications

This approach to developing a climate change risk assessment is proving to be a valuable one for the Falklands Islands Government and has helped to stimulate debate about climate change, its potential impacts at a local scale and some of the

measures that can be adopted to mitigate against those impacts. We feel it has wider applications to other island ecosystems and to other UK Overseas Territories in particular. We highlight a few points that have helped contribute to the success of the project so far:

- The need for good quality biodiversity data for decision making (an excellent plant dataset in this case) – emphasising the need for regular survey and on-going monitoring (this has implications for capacity building)
- The importance of wide consultations across all sectors (in this case: Government; NGO, Farmers/land owners; research community – both local and international; wider society) to develop locally-agreed and owned priorities
- The importance of integrating evidence and outcomes into existing Government planning systems and commitments (in this case the development of a ‘National Climate Change Action Plan’ where the biodiversity elements will be integrated into the Falkland Islands Biodiversity Strategy review process whilst non-biodiversity elements will be taken on by the relevant sector so that climate change impacts are mainstreamed across all sectors)
- This approach enables better implementation of existing national and international commitments (in the case of the Falklands contributing to the progress of Environment Charters and in the spirit of the CBD which the Falklands Government is actively considering extending but is evaluating the cost implications).

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Why do we Red List?

Jeremy Harris (St Helena National Trust)



Jeremy Harris

Harris, J.. 2015. Why do we Red List?. pp 83-87 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The *IUCN Red List of Threatened Species*TM is the global standard for assessing extinction risk to species. Over the past 50 years, it has grown from a fairly modest sampling of species to a giant database holding information on many complete taxonomic groups. The *IUCN Red List* shows trends of decline, and captures threats and conservation actions. By doing so, it drives conservation action, political attention, and perhaps most importantly funding, towards those areas that need it most. In recent years, the *Red List* has been a key tool in identifying for countries, international conventions, and funders the key areas in need of investment – examples include the loss of amphibian diversity due to a fatal fungal infection, the loss of coral as a result of ocean acidification, and the great threat to biodiversity in Asia from a variety of pressures.

Using examples of recent invertebrate and plant Red Listing on St Helena, we will take a brief look at the emerging evidence in our territory. We can then begin to make the case that the unique nature of the biodiversity on our islands, and the severe threats faced, merit a far greater level of international attention. The IUCN Red List will help demonstrate that, as the stewards of the vast majority of UK's biodiversity, the Overseas Territories have a crucial role to play in saving that which is most threatened.

Jeremy Harris, Director, St Helena National Trust. director@shnt.org.uk

Hello everybody and many thanks to the conference organisers for the opportunity to be here to talk about the work we are doing on St Helena to get our endemic species – and in particular our invertebrates – on to the IUCN Red List of Threatened Species, and why we are doing it.

Given the time constraints, I am not going to take any time really explaining the IUCN Red List, although I did work for five years for one of the key bodies responsible for its production and so am happy to take questions on it after this brief talk or if you grab me during the conference.

I will, for the sake of brevity, assume that you are all clued up on the central authoritative role this resource plays in global species conservation and particularly its significance as a reference point for directing expenditure by governments and others on conservation. I will come back to this a little later when I mention the Convention on Biological Diversity –the CBD – and the Aichi targets.

In 2014, the RSPB released a report that took stock

of the species across the UK's Island Territories – they brought together all known records from the last 300 years and what they found was in some ways alarming but in others highlighted a huge opportunity for those of us working in these places. The full report is available online.

The take home message from the report – for those big-picture people among you – was that the UK overseas territories contain 94% of the unique British species and 85% of the Critically Endangered species that the UK is responsible for. These percentages will have been creeping up



significantly with work we have been doing on St Helena, but I'll get to that in a bit.

Other interesting nuggets of information include the fact that St Helena has the most known unique species (502, sorry – I had to mention that), although Bermuda (who come a distant second with 321) were shaming us in the number that they had listed on the IUCN Red List (32 to our 26 – and Tristan deserve a special mention for their 26).

Unless Bermuda have been pushing on with their Red Listing since the RSPB report last year, then I suspect we have now pulled ahead – but perhaps we wouldn't have if we had the beaches that Bermuda does... that must be pretty distracting.

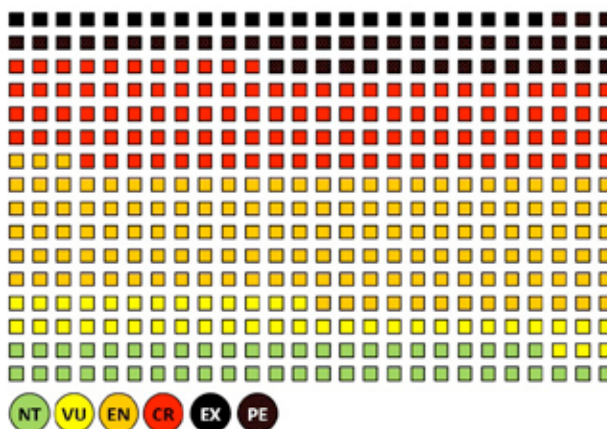
So, with that, let me bring you up to speed on what we have been doing recently. As a part of the Darwin and Bug Life funded project known as the 'Bugs on the Brink' project, we were required to submit some species assessments to the IUCN Red List. The Project Manager David Pryce took to Red Listing like a duck to water. For those that don't know David, he is one of the most impressive curators of data that I have ever come across – and I have worked for the Species Survival Commission, a network of more than 8000 data-obsessed individuals. Unfortunately, he's not able to be with us here as he is in Belgium photographing unique St Helena specimens in a museum somewhere for his next project on St Helena.

David set about mining his extensive existing data with the intention of compiling and submitting accounts for all 416 endemic invertebrate species on St Helena. Not a small task, as those of you that have worked with the Red List will know. In an attempt to hold him back from working his way into an early grave (cause of death: data poisoning), we agreed to break up the assessments into taxonomic groups and prioritize them. As of right now, 15 accounts have been submitted to the Red List and a further 90 or so have been prepared and are almost ready for submission.

Based on the pretty dramatic results when preparing these 105 accounts, I asked David to take a preliminary look at the complete picture. What he discovered has given us a lot to think about. I'd like to emphasize that what I am about to talk about is yet to be published formally and is therefore a best guess with a fairly high degree of certainty. No one has spoken publicly about this before so what you're about to hear is a UKOTCF Conference exclusive! Pens at the ready...

Let me first try and put the size of St Helena

into some context – we have around 123 square kilometres of land area. If you were to take the outline of South Africa, then within that take the outline of the small self-contained country of Lesotho, St Helena would fit into it like this.



Here is a slide showing 416 little boxes. Trust me – that's how many there are. 16 rows of 26. Feel free to stop counting them. Our best guess is that 49 endemic St Helena invertebrates are likely to come out as Near Threatened, 42 as Vulnerable, 146 as Endangered, 156 as Critically Endangered, and 23 are known to be Extinct. As many as 44 of the CR group may well be extinct – we just don't know yet but no one has seen them since the 1960s.

So in percentages then, at first pass, close to 83% of St Helena's endemic invertebrates are likely to fall within the Threatened categories of the IUCN Red List (that's the 'Vulnerable', 'Endangered', and 'Critically Endangered' categories). The greatest numbers – 156 – fall within the most threatened 'Critically Endangered' category.

While there is no question that all of this is pretty dramatic, the most alarming discovery was yet to come. St Helena is a remarkable patchwork of different habitat types – desert to cloud forest and many more in-between. The island rises to 823 metres above sea-level at the central ridge with multiple deep gullies formed where water



has carved its way back to the sea. When it comes to invertebrates, the distribution of our endemic species is what causes concern. There are two areas that are of particular interest – the first, Prosperous Bay Plain, is an arid area that now has an airport built on it. I'm not here to comment on the impact this has had – and neither am I qualified to. My colleague from SHG, Isabel Peters, will be giving more information to those that are interested in her talk.

The second area is what we call 'the Peaks' – various high, isolated, and fragmented pieces of cloud forest, cabbage tree and fern thicket. This is where, when it comes to invertebrates anyway, our central drama is played out. It seems that 119 of our 416 endemic invertebrates – or 26% – are entirely limited to this habitat. That's 26% of our endemic invertebrates living on approximately 0.5 square kilometres! I don't know for sure just yet, but I think that might mean that St Helena has the

most biodiverse half square kilometre of anywhere on the planet.

So why does all this matter to the pragmatist? The politician, economist, or average Joe going about his day? Perhaps it doesn't really, and I'm sure that all of you in the room have come up against the 'so what' argument at some point or other. This is where the IUCN Red List comes in.

Honestly, it all gets a little complicated since there have been multiple instruments in the last decades that set out the basic principles and obligations of countries if they are to achieve 'sustainable development'. I'm not going to pretend I understand many of these – I don't. I can drop the terms – the Rio Summit, the Framework Convention on Climate Change, Various COPs, Rio +20 – but I can see many of you already glazing over.

The point though is this: in 2010, the UK as one of the signatories to the Convention on Biological Diversity (the CBD) adopted a 'Strategic Plan for Biodiversity 2011-2020' which contained 20 targets called the 'Aichi Targets'. The important point here is that the UK Government has committed to an agreed plan to halt biodiversity loss.

Naturally there are a number of agreed ways to measure progress against the Aichi Targets and one of the dominant measures is the IUCN Red List. The Red List is relevant to measuring progress on at least 15 of these 20 targets. 15!

I don't know about you, but on St Helena we often feel a little disconnected from the wider world. That's the point of this conference as I understand it – to help us feel connected to each other. On St Helena, things happen at their own pace. I've lived for the past year without a mobile phone, without a bank card, without internet at home... If I want an apple, the first thing I need to know is when the ship last called. You get the picture.

The IUCN Red List gives all of us here the opportunity to plug into the much bigger global conservation engine. If the overseas territories get together and list all of the endemic species that we're responsible for, it will send a very clear message that, if the UK government is to meet the commitments they have made, a very sensible place indeed for them to start is with those of us at this conference.

So to answer the 'so what?' question I mentioned before, it's always going to be a little difficult working with that kind of attitude but I find that

saying something along the lines of “because 193 countries, including your one, have agreed it’s important and committed to spending millions of tax pounds on doing something about it” can help drive the message home.

And if that fails – you could always try “because they look cool”.



Near Threatened blushing snail Succinea sanctaehelenae Photo: Roger Key



Near Threatened St Helenian bicoloured tineid Opogona bicolor Photo: David Pryce



Near Threatened St Helenian ant spider Myrmarachne isolata Photo: Roger Key



Endangered (subject to confirmation) vulturine leafhopper Nehela vulturina Photo: Liza Fowler



Endangered (published) shadowy chafer Mellissius adumbratus Photo: David Pryce



Near Threatened (subject to confirmation) Decelle’s leafhopper Atlantocella decellei Photo: David Pryce



Endangered (subject to confirmation) Leleup's darkling beetle Tarphiophasis leleupi Photo: David Pryce



Critically Endangered Edith's leafhopper Chlorita edithae (first since 1875) Photo: Lourens Malan



Critically Endangered (subject to confirmation) fine stained glass leafhopper Artgaterma multisignata Photo: Roger Key



Critically endangered (subject to confirmation) spiky yellow woodlouse Pseudolaureola atlantica (world population of only 90) Photo: Liza Fowler



Endangered (subject to confirmation) cabbage tree sedge moth Glyphipteryx semilunaris Photo: Mikko Paajanen



Endangered (subject to confirmation) Flagstaff lacehopper Helenolius dividens (possible new subspecies) Photo: David Pryce

Using GIS and remote sensing to aid conservation monitoring

Katie Medcalf (Environment Systems), Tony Gent and Thomas Starnes (Amphibian & Reptile Conservation)



From top: Katie Medcalf,
Tony Gent

Medcalf, K., Gent, A. & Starnes, T. 2015. Using GIS and remote sensing to aid conservation monitoring. pp 88-1000 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Developments in remote sensing offer new opportunities for making evaluations of the environment. This is particularly true for our overseas territories where study areas are remote or inaccessible, or large areas need to be covered. The different uses of imagery analysis allow a wealth of information about our environment to be collected at excellent value for money. Such analyses include assessments of habitat composition and vegetation structure which can be used with further GIS modelling to show species suitability and help deliver conservation goals.

The presentation begins by demonstrating how object-based analysis (OBIA) and high and ultra-high resolution imagery can be used together with targeted field work effort to produce a range of different types of environmental maps. This includes maps on the terrestrial habitats of Anguilla, based on the structural components of the vegetation. A brief explanation of how this type of technology can be used to look at change over time, showing differences in vegetation cover of the island since 1984 is given. Some of the newer satellites produce imagery with wavelength that can 'see' into shallow water, and we discuss how this can be used to map marine features such as shallow water bathymetry, and basic shallow water marine habitat maps. Initial findings from an MPhil study on using these techniques to identify soil types on the island are also presented. The last brief case study will show how OBIA can be used to monitor nesting birds using landscape photography in a hard to reach off-shore islands. In each of these snap-shot case studies, the importance of understanding the environment and using targeted field work is demonstrated.

Such environmental data, together with physiographic and climatic information, can be used also to help understand the distribution of animal species through different modelling approaches. In essence, the relationship of actual species 'presence' records with environmental parameters can provide both a better understanding of the factors that determine how a species uses its habitat (i.e. 'inferential' analysis) and also allow the potential range of a species to be predicted via mapping ('predictive' studies'). Modelling can allow assessments of the probability of a species' presence in any area, which is particularly valuable for filling-in gaps in distribution maps, aid an understanding of how populations disperse through corridors and help target conservation activities. As well as providing an understanding of the current conservation status of a species, these approaches can also provide a valuable tool for understanding whether this status can be considered favourable. The European Union's Habitats Directive (1992) provides a good framework for such assessments identifying four parameters for evaluation, namely: population dynamics, range, habitat and future prospects. GIS and modelling allows these assessments at different spatial scales.

ARC has trialled this approach for herpetofauna species. The talk will show some of the outputs and identify some of the strengths and limitations. It will also highlight the fact that despite the considerable utility of such work it needs to be complimented by fieldwork.

Introduction

Many of the overseas territories are small island communities. They are facing pressure from a changing climate, growing populations and economic development (Pearse & Berends 2007). In order to face these challenges whilst preserving biodiversity and making the most of the natural assets, good data are needed on habitats and species in the terrestrial and marine environment. These data can be used to show how the environment supplies functions vital to the life and culture of the islands, which can help ensure that the significant habitats and the species they support will be valued and protected (Pearse & Berends 2007).

Two new and developing techniques provide increasingly useable solutions to help give good data on the environment and the species it supports. These are:

- recent and ongoing developments in the world of remote sensing
- advances in GIS and predictive modelling.

This paper considers both of these developments. Part 1 outlines the advances in remote sensing that are leading to the ability to map terrestrial and shallow water marine habitats and interpret wildlife photography in a new way. The second part of the paper considers how to describe and evaluate the conservation status of species to understand how current management is affecting the conservation ambitions for that species and how changes can be measured and monitored using GIS and habitat suitability models with accompanying field work.

Part 1: Recent and ongoing development in remote sensing

Background

Developments in remote sensing offer new opportunities for making evaluations of the environment. This is particularly true for our overseas territories, where study areas are often remote or inaccessible or large areas need to be covered, which would be difficult and costly by traditional field work methods. The different uses of imagery analysis allow a wealth of information about our environment to be collected.

Such analyses include assessments of habitat composition and vegetation structure, which can be used with targeted field surveys and further GIS modelling to show species suitability and help deliver conservation goals.

Remote sensing refers to any information gathered at a distance. It includes the use of satellite imagery and aerial photography, as well as imagery gathered from the newly emerging use of Remotely Piloted Aerial Systems (RPAS), often called drones. Finally, fixed camera recording can use the same analysis techniques to yield data from imagery.

Optical remote sensing uses images gathered either from satellites or airborne platforms to understand the surface of the earth. These techniques have been used for many years with manual interpretation of true colour, e.g. red / green / blue (RGB) aerial photography. The satellite imagery available records information at different wavelengths to those visible to the naked eye. These include the Near Infra-Red (NIR) bands and the Shortwave Infrared Bands (SWIR). These bands are particularly useful for land-cover mapping as they have a strong relationship to the vegetation productivity and wetness. Figure 1 shows the reflectance curve for vegetation. The x axis shows the electromagnetic spectrum with the Blue, Green, Red visible part of the spectrum and then the longer wavelengths into the NIR and SWIR.

The NIR signal is particularly useful for recording vegetation types, as its strength is related to the leaf structure. Unlike green light, which is reflected from the top surface of the leaf, and red

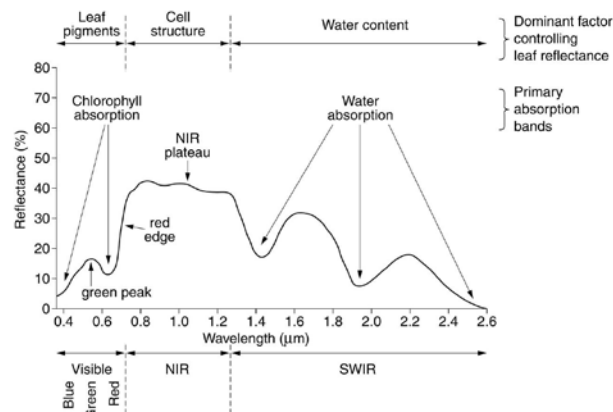


Figure 1. The reflectance curve for vegetation.

and blue light, which is absorbed and used in photosynthesis, NIR light passes through the top surface for the leaf but is generally reflected from the lower surface. Therefore, the more fleshy and productive the leaves, the higher the NIR signal. Within the SWIR bands, the signal is influenced by the water content of the vegetation and the soil and, therefore, can be useful for separating wet habitats, such as mangrove, from those with similar species but on a drier soil type.

One of the most significant breakthroughs in allowing the analysis of data is the use of Object Based Image Analysis (OBIA). Objects are created through a process called segmentation, which separates the image into blocks of similar colour, texture and a specified size threshold. Creation of objects before analysis allows other data about the objects to be used in the analysis, such as its location, slope, aspect, soil type, as well as the spectral values (Figure 2). Segmentation can also be used on standard photography: Figure 3 shows a normal landscape photograph of a large murmuration of starlings segmented to count 11544 starlings objects.

Remote sensing has recently been used in a project to produce a terrestrial habitat map for Anguilla (Figure 4) and its offshore cays, looking at selected plant community groups which can be readily separated by canopy differences. This habitat mapping used field studies undertaken by the Government of Anguilla and earth observation classification (Medcalf & Cameron 2013).

Plants of different species are visually different in all wavelength regions, especially those beyond the visible spectrum. The rule base allows the separation of objects based upon these differences and variation of features such as:

- Moisture content
- Surface roughness (manifested as shade)

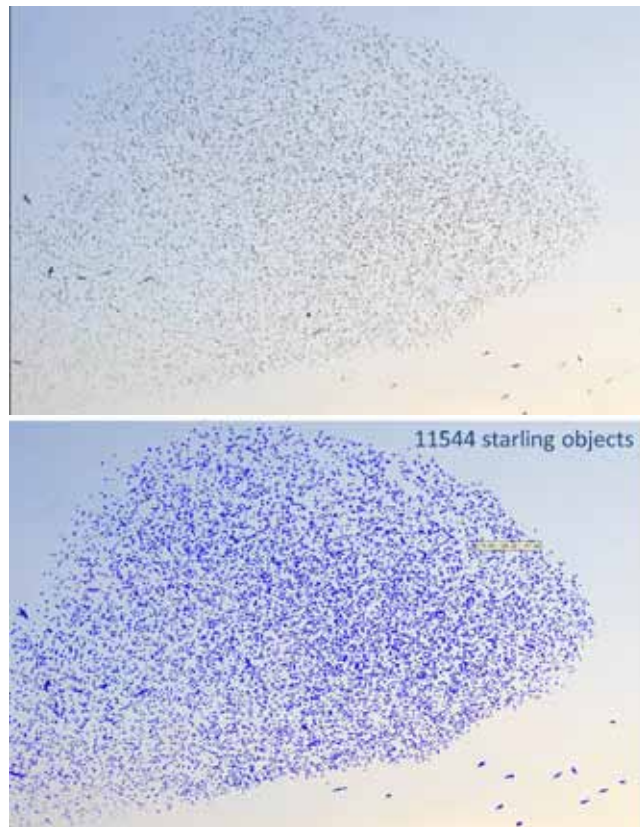


Figure 3. Large murmuration of starlings analysed using OBIA to give 11544 starling objects. Image A (above) shows the RGB photograph. Image B (lower) the starling objects output from eCognition

- Productivity
- Proportions of live and dead material
- Amount of woody material (i.e., biomass)

A large stack of data was gathered, which included: Landform data derived from Lidar, giving a DTM, slope and aspect layers; an urban and roads layer created during this work; RGB aerial photography, SPOT and WorldView-2 Satellite imagery. This imagery and derived contextual data was loaded into eCognition and a rule base was developed using segmentation and classification of the objects produced to give the first iteration of the habitat

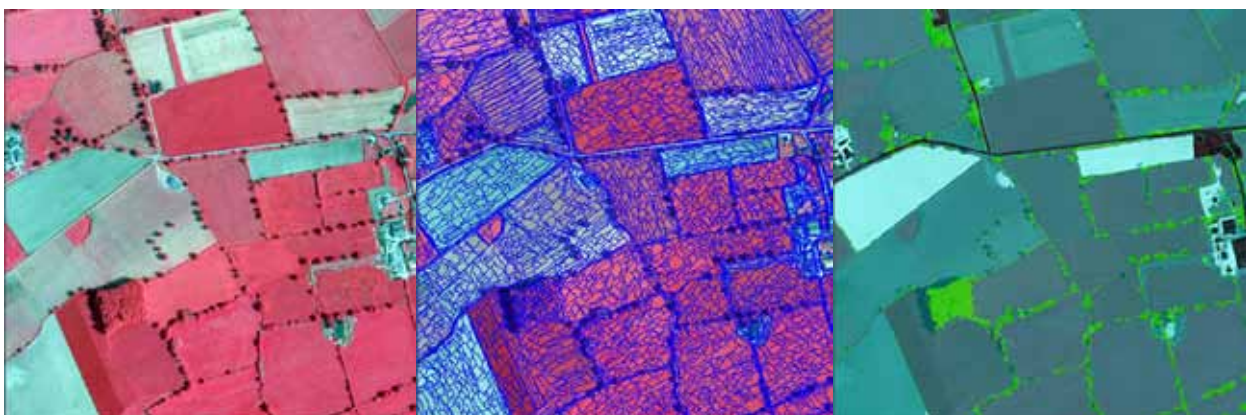


Figure 2. The process of segmentation: picture A (left) shows a colour infrared aerial photograph of some fields in the UK, in image B (centre) the initial segmentation is shown, image C (right) shows those segments which have the spectral characteristics of trees and hedges.

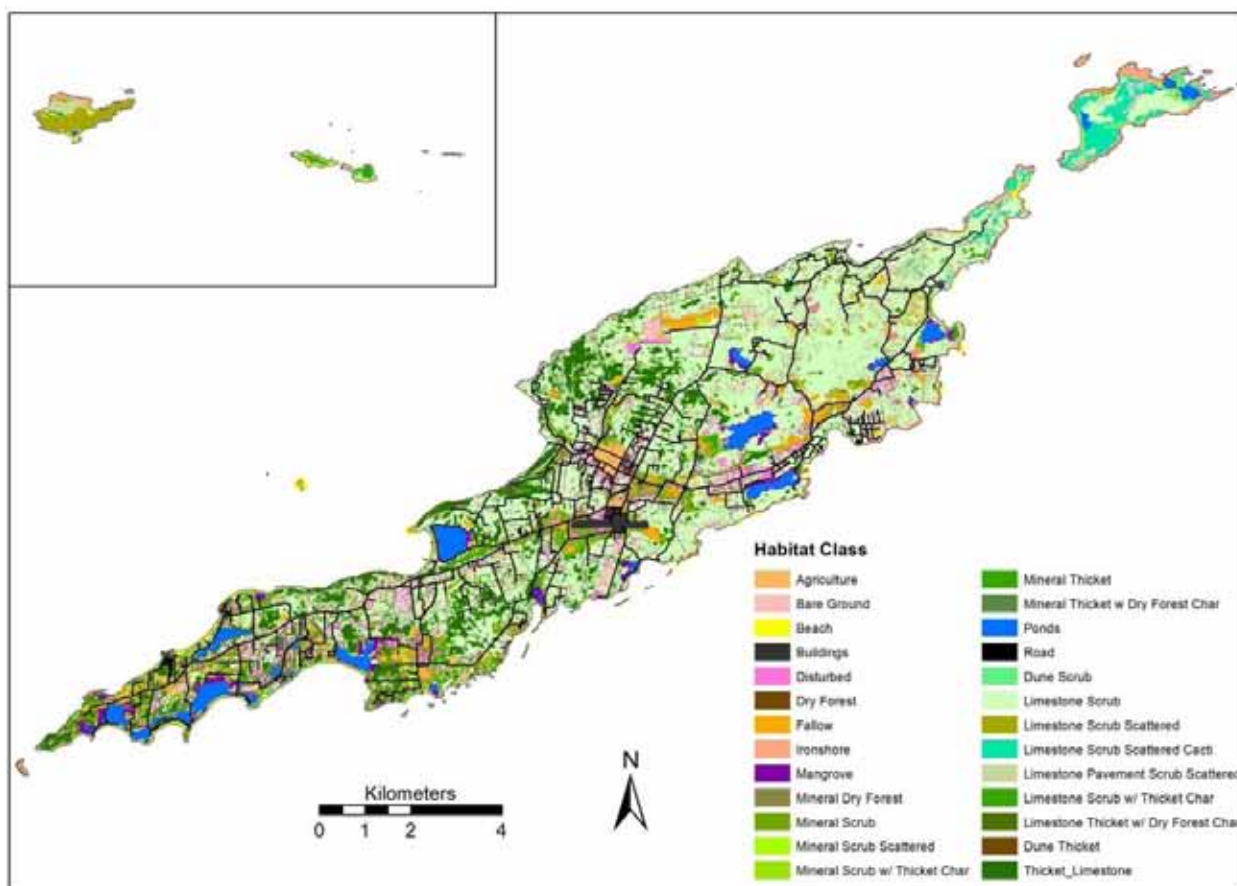


Figure 4. Terrestrial habitat map of Anguilla

map. The classification produced was validated during a field visit. This fieldwork analysis had two main purposes; the first was to check the initial remote sensing classification and the second to collect data to allow enhancements of the rule base. A further enhancement of the rule base was carried out to provide the final classification. In order to understand the accuracy of the map, it was assessed against 265 field work points that had been previously collected from vegetation transects by the Government of Anguilla. Most classes match the field work at over 80% accuracy. The errors were not randomly distributed; they tend to form in specific circumstances, for example:

- Shaded areas on steep slopes, where the spectral signature differs.
- Where the habitat has a different appearance because of an added species, for example *Mimosa* plants invading a scattered scrub area may cause it to appear differently from above; changes in soil type can also cause the spectral signal to change enough to fall outside the rule parameter.
- Because of management/anthropogenic influence (e.g. accidental burn), habitats can have an unusual phenotypic appearance
- Misclassification of habitats along ecotones or

within mosaics.

Because the results are not randomly distributed, it is possible to plan field work and manual aerial photography interpretation to correct the errors for a final map.

Having such a detailed habitat map available has allowed the government of Anguilla to include information about significant areas in a number of cases for policy review, including showing the value of the green economy and working out the contribution to the islands ecosystem services as part of the National Ecosystem Assessment. Further use of the map is discussed in the second half of this paper.

Another use of optical remote sensing has been demonstrated by another project in Anguilla, where earth observation was used to produce a marine habitat map of the Anguilla archipelago looking at the primary benthic classes and deriving a bathymetric dataset Figure 5. The marine resources on the island comprise white sandy beaches, clear and warm waters and extensive natural reef systems. For the past eight years the tourism industry, attracted by these features, has fuelled the socio-economic development in the country, contributing to over 70% of the Gross Domestic Product.

Erosion channels (from
SciMap) LiDAR DTM and
Suspended Sediments
2104 (2 days post
Gonzalo)

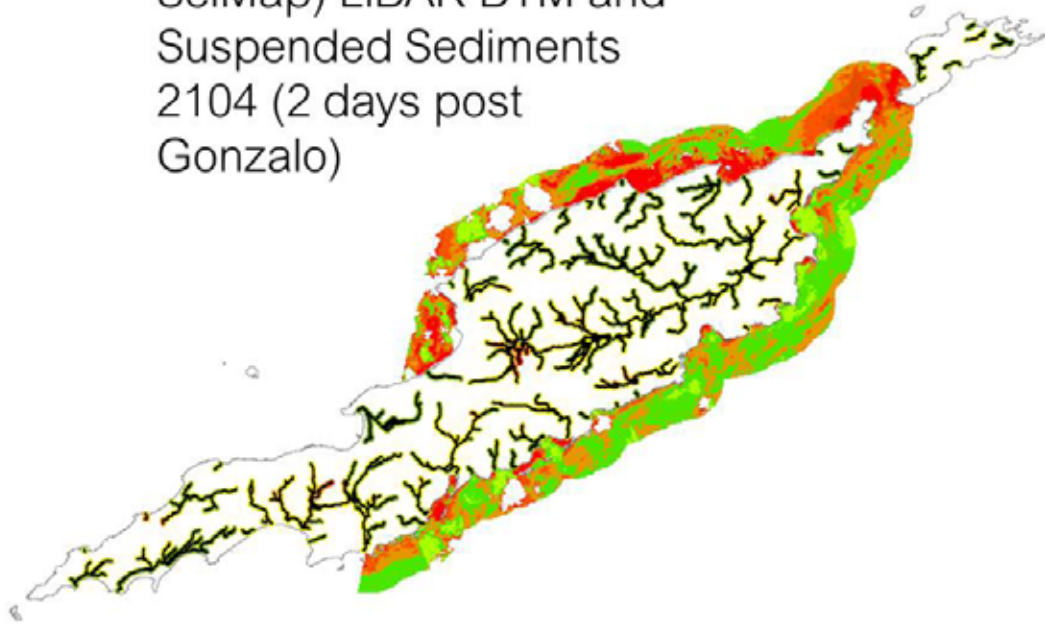


Figure 5. Bathymetric map of Anguilla

Building on the knowledge of the electromagnetic spectrum explained for the terrestrial environment, light behaves differently when passing through a column of water with the amount reflected becoming weaker with increasing depth. Different wavelengths of visible light penetrate water to varying depths; higher wavelengths (i.e. NIR and SWIR) attenuate rapidly, whilst blue light penetrates the water column to a greater depth. New advances in satellite technology have introduced a very low, coastal blue band. This band is absorbed the least by water, and can therefore penetrate the water column to around 15m depth. Field data was obtained from a marine-based survey from 1995 (Government of Anguilla 2011) and modelled from dive transects into a GIS dataset. Additionally, a rapid visual assessment via snorkel of the marine benthic environments and more detailed SCUBA transects were carried out in May 2013, by Newcastle University. These provided estimates of the percentage of sand, algae and coral cover, with the SCUBA transects offering depth information and benthic cover down to species level. A further survey conducted in February 2014 by the DoE together with the Department of Fisheries & Marine Resources provided a further dataset with depth information.

The image stack used in the development of the marine rule base for the Anguillan archipelago includes:

- WorldView-2 satellite imagery
- Shallow water depth

- Fetch, used as a proxy for wave action
- Topographical layers derived from the bathymetry

The imagery and derived contextual data were loaded into eCognition and a rule base was developed using segmentation and classification of the objects, based on ecological knowledge; this resulted in the marine habitat map.

As light behaves differently, both on and within the water column, it is necessary to reduce the impact this may have on the imagery before entering the stack. Sun glint is a specular reflection of light directly from the sun towards the sensor and can sometimes be so high that it is impossible to retrieve any meaningful data. The exponential decay of light intensity with increasing depth can result in considerable confusion, so that the spectra of sand at a depth of 2m may have the same signature as vegetation at lower depths. To compensate for these affects, correction techniques following an extensive desk study were applied.

Relative bathymetry was determined using a natural log band ratio method, to linearise the spectral decay as a function of depth using the coastal blue and green bands; this takes advantage of the spectral decay of green before blue within the water column. The techniques used are robust and repeatable; they can be used to monitor change and input into further analysis of ecosystem features such as the monitoring of shallow sand loss. The data created during this work can be

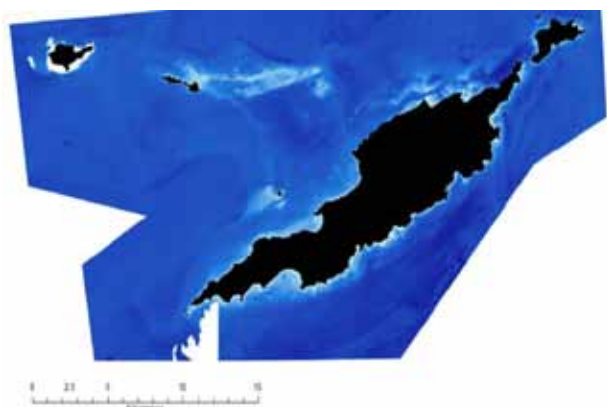


Figure 6. Erosion channels (from SciMap) LiDAR DTM and Suspended Sediments 2104 (2 days post-Gonzalo)

used as a basis for sustainable decision making in Anguilla's planning processes by the DFMR (Department of Fisheries and Marine Resources) and all relevant natural resource management agencies.

During the marine analysis of Anguilla, a method for detecting Total Suspended Solids (TSS) using EO techniques was used to create a map of where sediment burden in the water column was higher; this is based on the work by Ouillon *et al.* (2008) and utilises the Red Edge spectral region. One of the biggest advantages of remote sensing is that imagery is available from the mid 1980s. Taking imagery from 1984, we were able to approximate the suspended sediment burden in the water and

compare it with the 2012 survey (This was an approximation, as the 1984 data were not as robust as current spectral data). In addition, a Landsat 8 image was available from 2 days post-Hurricane Gonzalo. Running the SciMap (Durham University 2015) model across the island showed the drainage channels, where rainfall in extreme events was likely to run. There is a strong visual correlation between the two features, which could indicate some of the areas where sedimentation form the land is contributing sediment to the sea; this can smother coral and decrease reef health with knock on effects to fisheries resources and coastal protection (Bellwood *et al.* 2004; Wilkinson 2008) (see Figure 6).

Landsat scenes can also be analysed to show the growth in urban development over time, as shown in Figure 7 where those areas shown in brown have been developed since 1984. This sort of image is very useful when considering environmental scenarios, as business as usual could be considered as a similar amount of development in the next 30 years as was seen in the past; that would result in a significant area of Anguilla being developed.

Turning to standard photography, Figure 8 shows how using a camera with a telescope to take overlapping photographs of the top of Boatswain bird island off Ascension Island allows a seamless image to be created using Agisoft PhotoScan

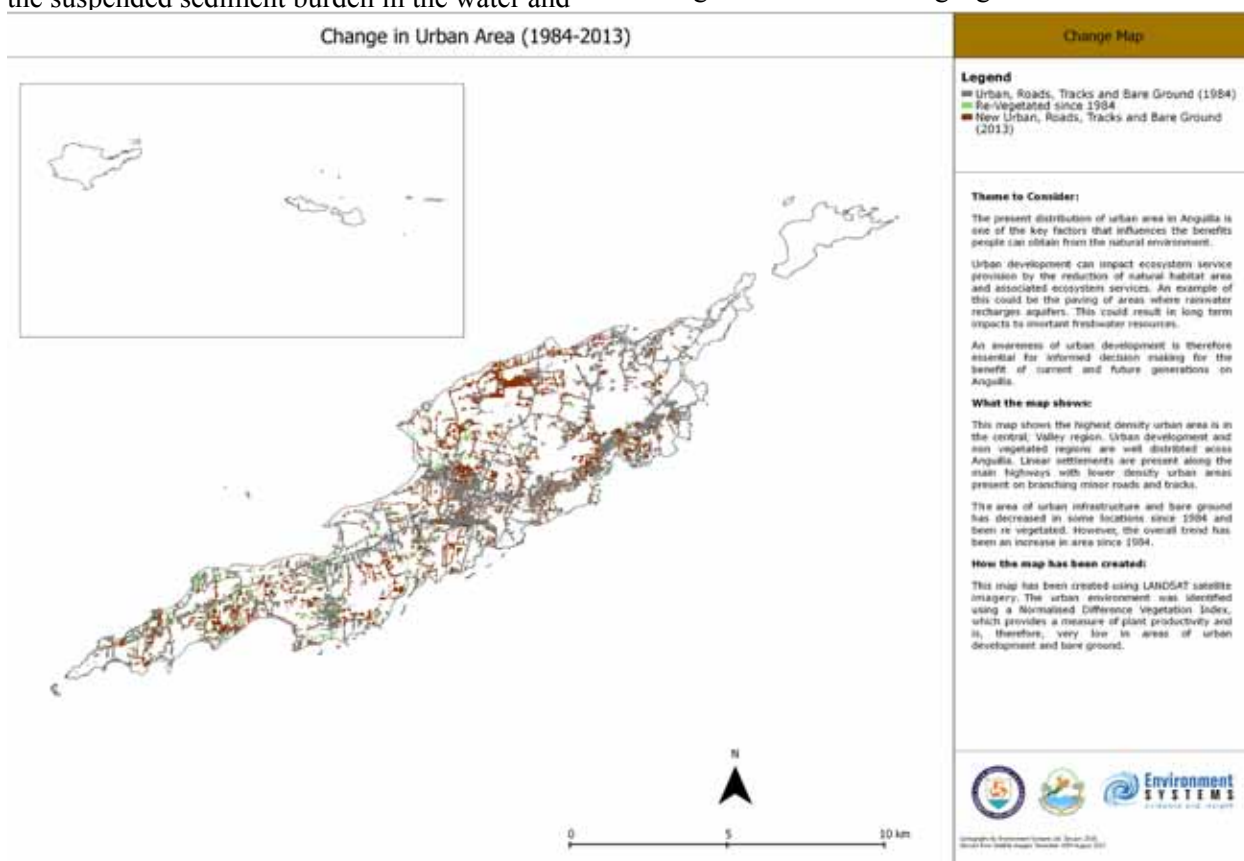


Figure 7. Showing change in urban area in Anguilla since 1984 following Landsat analysis.

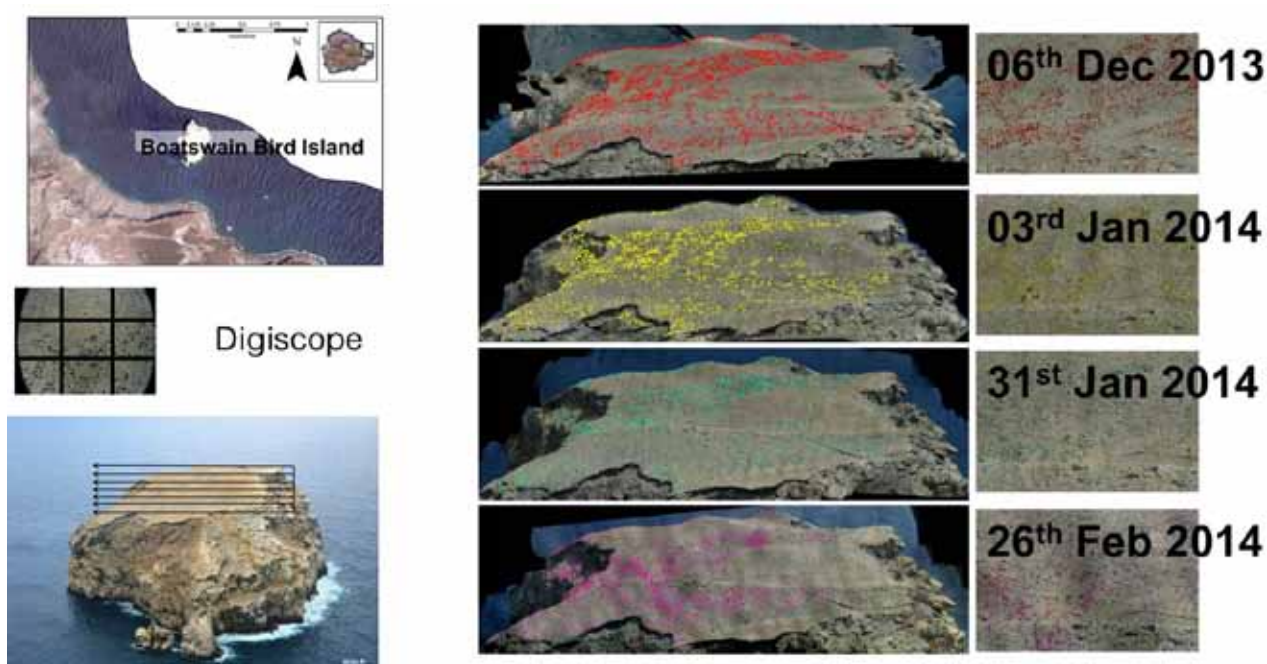


Figure 8. Identification of frigate-birds on Boatswain Bird Island

(Agisoft 2015). This was then analysed in eCognition to identify objects that were classified as frigate-birds. Ascension Island Conservation Department is analysing the resultant files to record where birds are found in the same location month to month; these are likely to be nesting individuals. This will allow be the most complete picture of the population dynamics of the frigate-birds on Boatswain Bird Island.

Part 1: Describing and evaluating the conservation status of species

The evidence base needed for species conservation

While much conservation can be achieved simply through safeguarding and managing habitats, the value of this to the conservation of particular species is not always known or predictable. Similarly, the significance of any changes might not be understood by the land managers. Being clear about both the current status of a species and what a 'desired' or 'target status' might look like, even if it just a 'direction of travel' (e.g. 'increase'/'maintain levels'), can assist conservation action and guide the development of monitoring programmes.

To do this, it is necessary to have information about the species and, for appropriate monitoring and surveillance, data that aids both articulation of conservation ambitions and allows changes to be measured. We have found that the approach

provided in the European Union's Habitats Directive (1992) sets a valuable framework for describing and evaluating the conservation status of species and for determining when this level is favourable. This approach looks at four key parameters:

- Range
- Population
- Habitat
- Future prospects

Developing appropriate metrics for each of these to provide appropriate measures to help land managers and scientists is a key consideration.

Using remote sensing data to support species conservation and status assessments

Skilled field naturalists are able to assess how good a habitat is for particular species based on experience: their assessments are made on habitats types, topography and knowledge of the local climate. These assessments will also be nuanced by understanding subtle variations, including soil type, the structure of the vegetation and specific nature of micro-habitats. Ecologists undertake a similar evaluation, but 'the other way round'. They draw together data associated with field observations and evaluate statistically the key features affecting the way in which a species uses its habitat. Species Distribution Modelling (SDM) provides an equivalent approach using computers – allowing the relationship between species occurrence (and sometimes species

absence) and environmental variables to infer the most significant factors influencing a distribution (inferential modelling) and also to determine those areas where the species is most likely to be found (predictive mapping). These analyses will be affected by the volume, accuracy and quality of the data used to feed them. With increasing precision in recording locational data (sighting data at sub-ten-metre precision), and corresponding high quality and accessible environmental data, such analyses should become increasingly more useful and more widely used. These models can help limit *a priori* assumptions and bias, but do risk drawing invalid conclusions unless assessed with appropriate ecological understanding provided by specialists. In turn, models can be continuously improved by factoring in parameters based on expert knowledge, with statistical validation offering the potential for increasingly accurate and valid understanding of species distributions.

Remote sensing data offer particular potential for allowing accurate, detailed information to be collected over large and even inaccessible areas. Modelling and GIS analysis enable ecological assessments to be made over areas where traditional field methods would struggle – perhaps through difficult terrain or through lack of human resources. They allow also the integration of data from a number of studies where sufficient accuracy is recorded. This may mean that analyses can use a large combined data-set – perhaps much greater than could be gained through a single study – or, conversely, allow generalised conclusion to be drawn from small samples provided due caution is applied and any limitations reported transparently.

Developing models for herpetofauna in the UK

Our interest in modelling was largely driven by the need for better and more accessible data on species, and in particular those that have a wide geographic distribution and where fieldwork alone would be too expensive to provide a sufficient level of understanding. In particular the need was identified for better information about great crested newts *Triturus cristatus* (Figure 9), a widespread species that has received full protection under both UK and European legislation largely as a result of the massive declines reported in recent history (Beebee 1975; Swan & Oldham 1992). Directing positive conservation actions and targeting funding regimes have suffered through lack of data, while (and with higher political resonance) the presence of this species in areas where



Figure 9. Great crested newt *Triturus cristatus*
© Fred Holmes

there are development proposals has resulted in considerable delay through the need for survey and appropriate mitigation/ compensation schemes being developed and implemented. There has been significant survey effort, though it is estimated that we probably know of around 5,000 occupied ponds while estimates of actual numbers range from a conservative 18,000 up to 100,000. In either case it is likely that we don't know definitively where the majority of newts are.

We have explored a number of approaches, including developing a method that allowed assessments at 1km² level that defined the 'ecological limits' of the species and 'removed' squares that did not match these (*i.e.* 'Removal modelling' by Wilkinson *et al.* (2011) – see Figure 10); methods that use presence-only modelling such as MaxEnt (Phillips *et al.* 2004, 2006), (see Figures 11a and 11b) and, more recently, more elaborate modelling approaches using 'presence and absence' data (*e.g.* Generalised Linear Modelling, (Venables & Ripley 1994)) were explored. These methods have allowed predictive distribution maps to be created, including analysis of population connectivity, targeting of conservation work and measurement of impacts (*e.g.* from development). Work is currently underway to evaluate these different approaches and assess their inferential and predictive power.

Work in the UK Overseas Territories and Crown Dependencies

The UKOTs and Crown Dependencies are of considerable importance herpetologically, with over 125 native species, compared to just 13 in the UK (Edgar 2010; Churchyard *et al.* 2014), an example of which is the Anguillan bank anole (Figure 12). They are also often small, and vulnerable to a range of pressures. Remote sensing

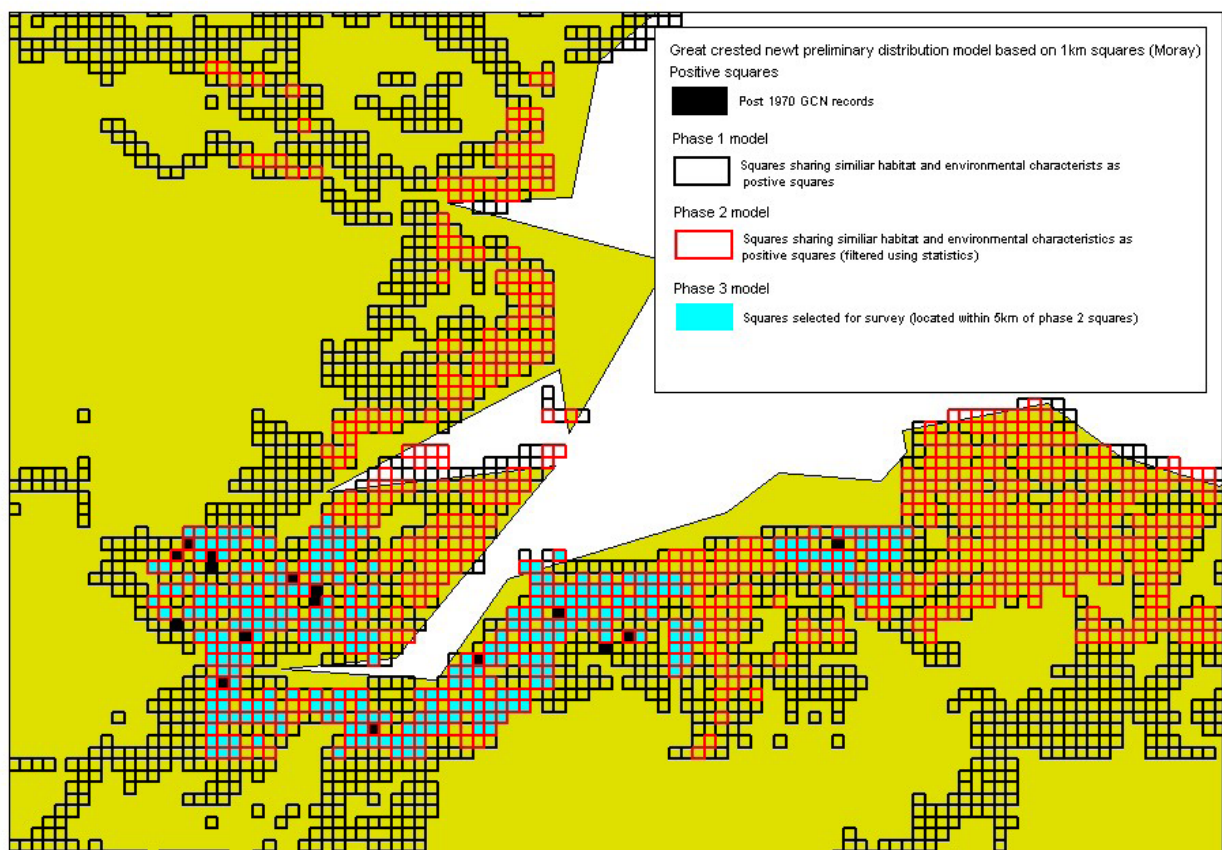


Figure 10 (above). Predicted distribution of *T. cristatus* in Central Scotland through 'removal modelling' at 1km² level

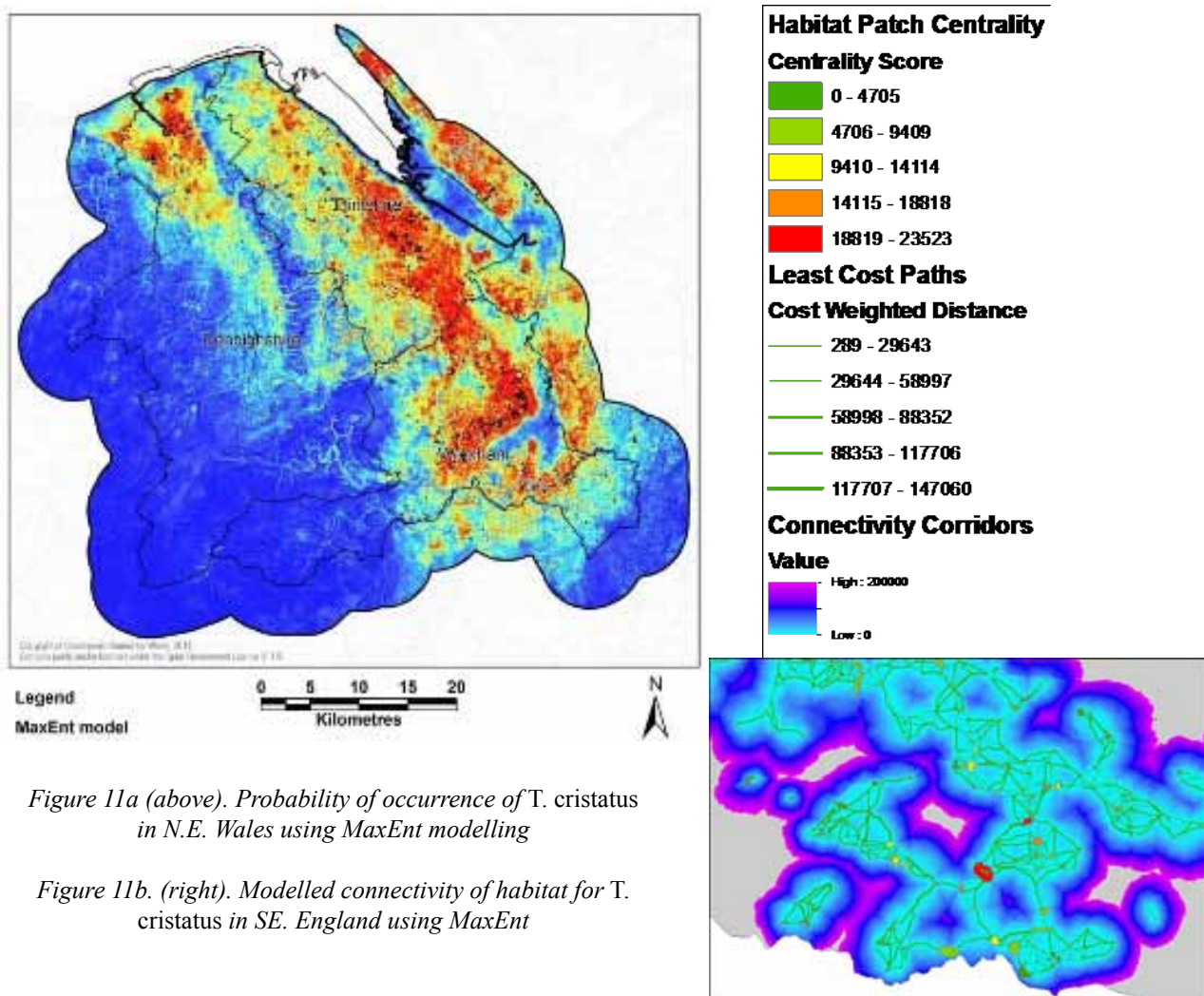


Figure 11a (above). Probability of occurrence of *T. cristatus* in N.E. Wales using MaxEnt modelling

Figure 11b. (right). Modelled connectivity of habitat for *T. cristatus* in SE. England using MaxEnt



Figure 12. Anguillan band anole *Anolis givivinus*
© David Greenwell

Island dwarf gecko *Sphaerodactylus sputator*
Sparrman 1784

Anguilla Bank ameiva *Ameiva plei* Duméril &
Bibron 1839

Anguilla Bank anole *Anolis gingivinus* Cope 1864

Anguilla Bank racer *Alsophis rijersmai* Cope 1869

Big-scaled least gecko *Sphaerodactylus macrolepis*
Günther, 1859

Turnip-tailed gecko *Thecadactylus rapicauda*
Houttuyn 1782

Neotropical skink *Spondylurus* Fitzinger 1826.

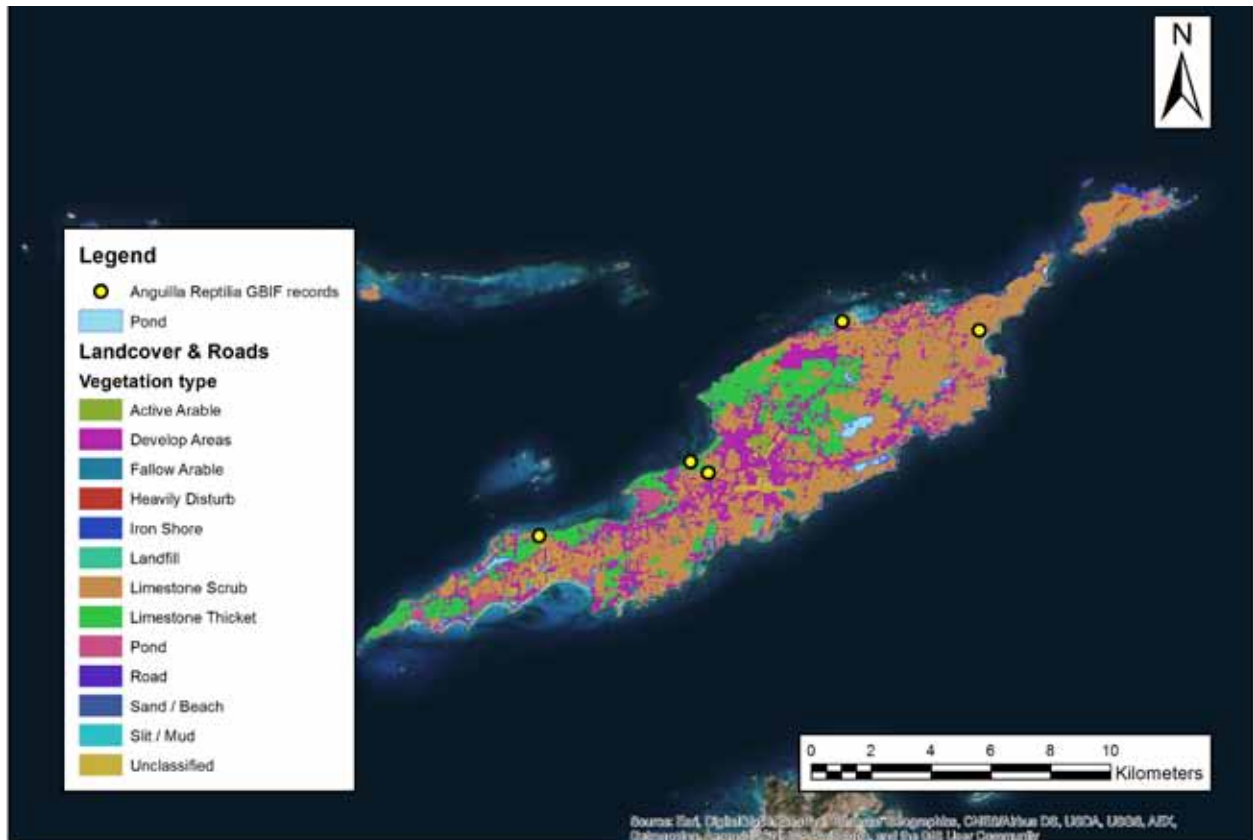


Figure 13. Landform types in Anguilla (Environment Systems and Dept of Environment, Government of Anguilla)

projects offer considerable potential for providing rapid, up-to-date assessments of herpetofauna habitat status that complement existing survey programmes in the UKOTs. With a view to illustrating this approach, using environmental and remote sensing data provided by Environment Systems and Dept of Environment, Government of Anguilla (see Figure 13), we modelled potential reptile distribution in Anguilla, using herpetofauna data publicly available on Global Biodiversity Information Facility (GBIF); a few additional data were obtained from geo-spatially referenced photographs on Flickr; however they were not used in this analysis. We used MaxEnt (which allows modelling from presence-only data) based on five spatially unique points. The data relate to six species and one genus:

A minimum of five species presence points are needed; the predictive map of 'reptile habitat' shows the five points on which the analysis is based and is provided in Figure 14.

All of these data come from University of Kansas Biodiversity Institute Herpetology Collection (University of Kansas Biodiversity Institute 2015).

Although there are seven georeferenced reptile taxa in this dataset, there are only five unique locations, hence five presence points on the map. While they appear to be at a spatial precision of 1 metre, this may not be the case (and hence need to be utilised with caution).

While this model is based on only a very small amount of available species data and these are

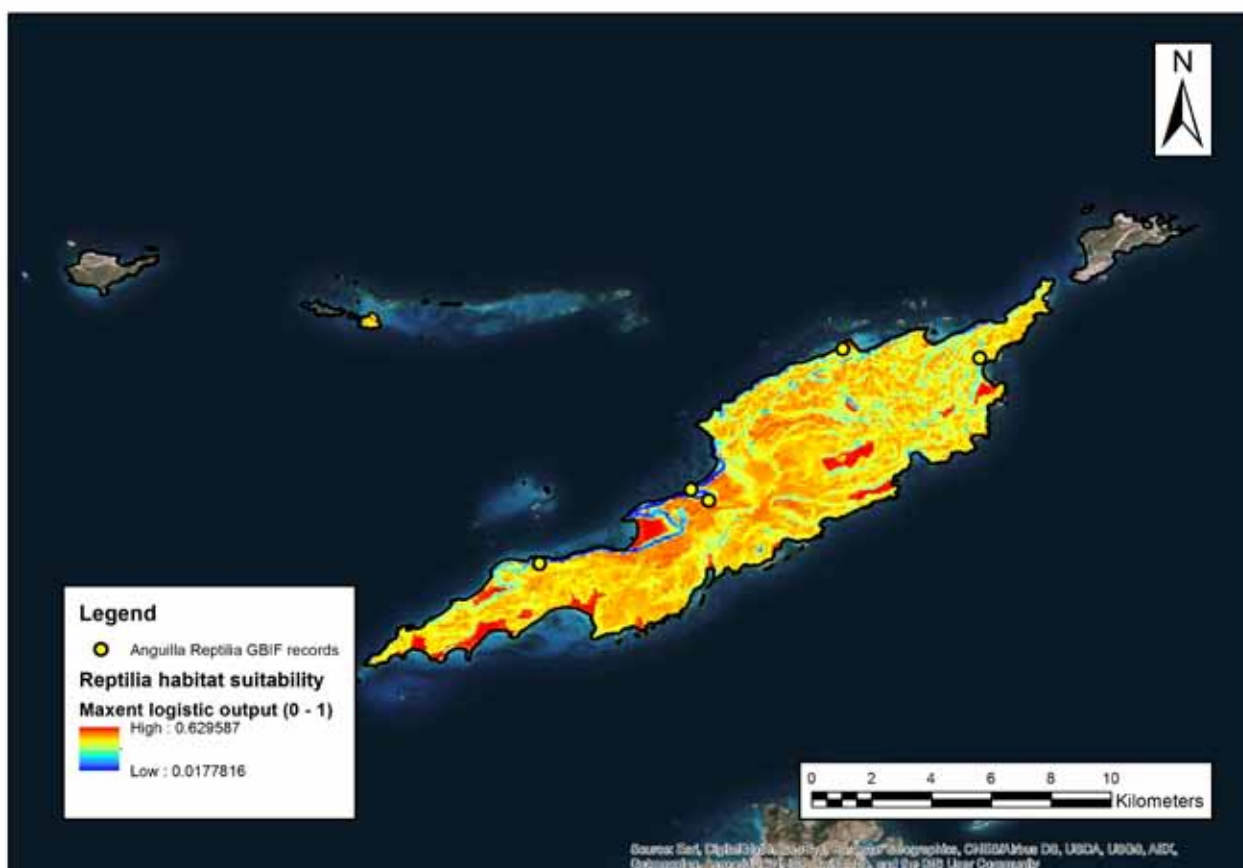


Figure 14. Predictive map of reptile habitat in Anguilla derived via MaxEnt, showing location of records acquired from GBIF

from ecologically very different species of lizard, the output has some biological relevance as the taxa belong to the same class (Reptilia). The models indicate the apparent influence of elevation on the occurrence of reptiles (in fact, the species data we have represent only low lying land occurrences) (Figure 15). We would not wish to rely on such a limited data-set for drawing any conclusions about the status or habitat uses of these species. However, the output does provide an illustration of the potential for this application and could assist with targeting survey work.

We recommend further exploring the potential for such approaches with a view to developing equivalent methodologies for other taxa.

Importance of ground-truthing and continuing survey

Models can only be as good as the data on which they are built – and may not be able to take account of important ecological factors. The models we have developed have been based primarily on climatic,

environmental and habitat variables; e.g. rainfall, temperature, soil types and pond densities. Remote sensing data (e.g. via LiDAR) has provided more detailed vegetation/ habitat information (including vegetation structure). However, we have not included information that may have a significant impact on a species occurrence. For example, in the case of great crested newts, the presence of fish or waterfowl can have a strong negative impact

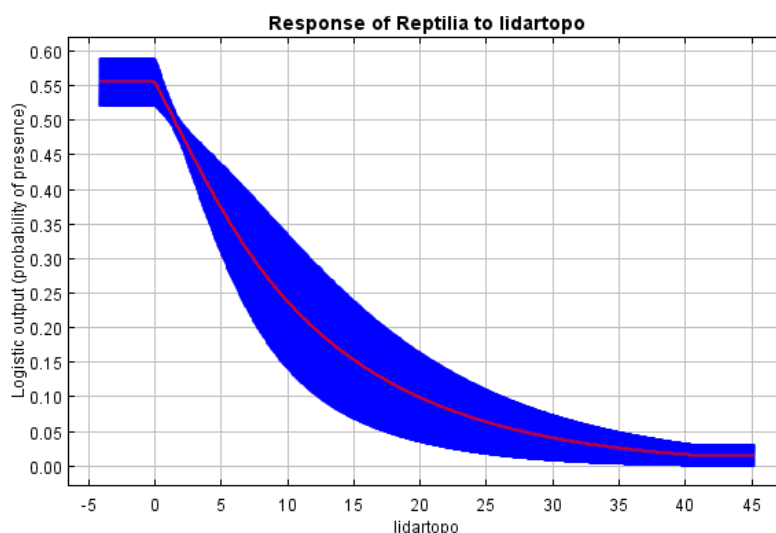


Figure 15. The influence of altitude provided by LIDAR; the model is strongly influenced by lower elevation, with coastal location of most of the species records.

on newt presence. This may have some adverse consequences for modelling, *e.g.* where high pond density is a positive influence on newts, high density ponds can also encourage the persistence of fish (and in some cases are themselves fish-farms) which is a highly negative factor affecting newt distribution. As well as meaning that models may sometimes suggest that a species should be present when it is not (false presence), inclusion of 'absence' data can in some cases skew the model to drawing incorrect conclusions about how pond density influences newt presence. Other similar factors could include the presence of competitor or predator species, disease or assessments of areas from which a species has been lost (*e.g.* due to wild fire) and is physically unable to recolonize despite the suitable condition of habitat, perhaps due to the isolation of the site or through presence of natural or manmade impermeable barriers (such as rivers, roads).

Therefore, modelling should not be considered a substitute for survey and, indeed, any model development should devise an appropriate programme of ground-truthing to validate its outputs. Thus we see modelling not as a competitive method to field survey but as a complementary process.

Opportunities: communications and wider public involvement

Modelling and GIS outputs can be both visually attractive and easily understood, and so potentially relevant to a wide audience. Therefore they provide effective communication tools for informing a wide range of people about species status, and a good platform for communicating conservation needs and guiding policy decisions. They can provide a very simple visual output to support citizen science projects, and use basic information to contribute to sophisticated analyses. We feel there is a particular value in developing such approaches to assist specialist volunteer programmes – including scientific 'ecotourism' catering for dedicated enthusiasts keen to develop new skills, learn more about their interest and gain new (scientific) experiences. While learning the modelling and mapping techniques provides a new (exportable) skill, the outputs will greatly enhance the value of and provide rapid feedback to field surveys. Such an educational programme could provide a sustainable basis for assisting with long term surveillance and monitoring programmes.

Conclusion

Understanding the environment is important for meeting biodiversity priorities and for the wider economy, and in particular in communities under pressure from a changing climate and rapid urban development in association with a growing economy and increasing population. As well as working towards biodiversity goals, the understanding of ecosystem function will help conserve the many important features important to the economy of a community sustained through biodiversity.

Remote sensing and ecological modelling for habitats and species have the potential to significantly aid the understanding of the functioning of the environment in the Overseas Territories. They can provide an important component of the 'tool box' of survey techniques, supporting both the design and interpretation of surveys. The wide range of maps that can be produced, including vegetation, species distribution and surface elevation models provide valuable tools for policy makers and for explaining the importance of the environment to a wider audience. They also provide a valuable means for monitoring and demonstrating environmental change and the impacts of land-use decisions.

Recommendations to further the implementation of Environmental Charters and Aichi targets

We advocate that work on implementing the Environmental Charters is supported through a programme that further develops remote sensing across the UKOTs. The wide range of potential applications of such data means that funding may be available via a number of different 'end-users', making this a more affordable and cost-effective exercise. Such applications include:

- Habitat and environmental mapping, underpinning our understanding of the environment
- Remote sensing as a cost effective way of making the most of field work to produce maps for policy making and monitoring
- Modelling for species' habitat suitability, which is also a very useful technique in targeting field effort and can provide economic benefits in eco-tourism as well as helping reach and maintain biodiversity goals and targets

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OT Biodiversity Data Access Project

Tara Pelembe & Steve Wilkinson (Joint Nature Conservation Committee)



Tara Pelembe

Pelembe, T. & Wilkinson, S. 2015. OT Biodiversity Data Access Project. p 101 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

We are all aware that there are a lot of UKOT biodiversity data gaps. However, there are also a lot of UKOT data that have been generated over a number of years and that sit in a wide range of organisations, in a wide range of formats, and are not accessible to those who need them for decision-making or who could make good use of it for research.

In an attempt to provide better access to these data, and to minimise the risk of this scenario continuing in the foreseeable future, JNCC has created a UKOT biodiversity data access project. Under the project, JNCC is working with a wide number of UK organisations to attempt to mobilise the UKOT data they hold by making it accessible through existing data-sharing platforms. Parallel and complementary initiatives are being undertaken with the UKOTs to strengthen UKOT-based data management systems where this is required, and to share best practice between islands.

The project is making good progress, and there has been strong support for the principle. The first 'active' step is a focus on standardisation of meta-data and non-spatial species data. This talk provides an overview of the concept and the project, and gives an update on the consultations and support that have been galvanised to date, with a view to including those who are not already involved. In addition the action required to support the initiative, opportunities and next steps will be outlined.

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(The author has opted not to supply a full version of the paper.)

Conserving plant diversity and establishing ecosystem based approaches to the management of forest ecosystems in the British Virgin Islands

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Nancy Woodfield Pascoe

Pascoe, N.W., Hamilton, M., Harrigan, N., Grant, K., Massicott, M., Hodge, D., Clubbe, C., Barrios, S., Heller, T., Linsky, J. & Corcoran, M. 2015. Conserving plant diversity and establishing ecosystem based approaches to the management of forest ecosystems in the British Virgin Islands. pp 102-104 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The British Virgin Islands' (BVI) vegetation habitats have been mapped using geographic information systems (GIS) in order to create a base map that will be used to identify gaps within the protected area network that the National Parks Trust of the Virgin Islands (NPTVI) manages. A team consisting of staff from NPTVI and project partners at the Royal Botanic Gardens Kew (Kew) assessed and mapped the distribution of endangered and endemic plant species using geographic information systems (GIS), in order to identify plant areas which may require special protection. The use of GIS in this process is critical to enable the NPTVI to provide guidance to the Town and Country Planning Department during the development planning process. The management of forests throughout the BVI was assessed through a stakeholder consultation process and the conservation role of the JR O'Neal Botanic Gardens is being strengthened as more threatened native species are incorporated into the collections as a result of the field work that is being undertaken.

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Discussion

This project was implemented across the Territory of the BVI, which is located in the Eastern Caribbean. The project team visited over 90% of the islands in the BVI in order to ground-truth the vegetation habitat and to search for threatened species of interest. There were major gaps in botanical information across the BVI, as previous Darwin-funded projects in the BVI had focused on specific sites on Virgin Gorda and Anegada, with little modern information known about the status of threatened plant species across the BVI as a whole. Historic records derived from herbarium vouchers at Kew assisted in guiding the project

team to likely areas where threatened species were previously reported. These gaps in botanical information also meant that the last version of the British Virgin Islands Protected Areas System Plan 2007-2017 did not take into consideration or include areas with plant species of interest, and instead was more focused on the expansion of the marine protected area network. This project has since identified additional areas that could be proposed as new protected areas.

NPTVI manage twenty terrestrial sites and there was very limited information on plant diversity within these areas. One of the goals of this project was to create plant lists for select national



*Natasha Harrigan, JR O'Neal Botanic Garden
Terrestrial Warden, collecting a herbarium voucher at
Dead Chest National Park Photo: NPTVI*

park sites, in order to guide better conservation management and provide more information for interpretation of national park sites.

The NPTVI is a member of the BVI Government National GIS (Geographic Information Systems) and is responsible for maintaining data-layers relevant to the environment. There was not an existing digital vegetation base-map available for use, other than a satellite-based GIS vegetation layer of the BVI completed by the University of Colorado in 2000, which was never ground-truthed. This project sought to ground-truth this existing map to evaluate its level of accuracy, so that it could be used with confidence as a base-map in the National GIS, which is a major source of information in the development planning process, of which NPTVI participates as a committee member of the Pre-Planning committee under the Town and Country Planning Department.

The British Virgin Islands are a small island developing state with great development pressure and limited land area, on steep slopes that are relatively undisturbed at present. The timing of this project is critical as there are increasing numbers of large-scale development applications being submitted to the Town and Country Planning Department in areas that have been previously

undisturbed. Before the landscape of these sites is altered, it is essential to know what plant species exist and the quality of the vegetation habitat, so that recommendations can be put in place to reduce the amount of biodiversity loss and habitat destruction. These challenges are relevant to all stakeholders, from the conservation managers such as NPTVI and Kew who conduct the research and document the biodiversity, to private landowners whose land might contain plant species of interest, some of which might be critically endangered, and to Government Departments who must manage land use and who require more information on the natural habitats and their relative value ecologically in order to make informed decisions on whether development applications should be approved.

The revision of the Protected Areas System Plan is still ongoing as there were so many new botanical findings realised through this project across the Territory that more research on key areas is required to narrow down the sites that should be proposed protected areas and which could remain privately owned, but with recommendations for development restrictions. NPTVI and Kew will continue to survey the likely habitats where threatened plant species may be found and then develop a GIS map with proposed boundaries of new sites for protection that can then be discussed with stakeholders within the Government, private landowners and the wider community.

Results

The field research was successful in producing a report on the phenology of 21 key threatened plant species, which exceeded the proposed project target of 15 threatened species. This information was previously unknown, so a major change is that the NPTVI staff can now target seed collection activities to the correct time of year, saving valuable time and staff resources and result in more seed collections of threatened plant species. Further monitoring of these key species is required as more observations are needed to ensure that the phenological report is an accurate portrayal of the flowering and fruiting behaviour and was not the result of climatic conditions in specific time periods.

Collections were made of herbarium voucher specimens and live collections. The proposed project target of 200 herbarium voucher specimens was exceeded as a total of 435 were collected, of which 225 are still pending assessment at Kew with



Machaonia woodburyana - a critically endangered plant found only in the British and US Virgin Islands Photo: NPTVI

the remaining 210 vouchers being processed and incorporated into the Kew collections. This activity represents a change as many of these species had not been collected as herbarium specimens from the BVI previously and are currently being stored at Kew until such time in the near future when a small herbarium can be established at the JR O'Neal Botanic Gardens, and duplicates can be repatriated to the BVI for NPTVI staff and the wider public to use as a reference collection.

The proposed project target of 100 living collections was exceeded, with 110 new accessions into the Joseph Reynold O'Neal Botanic Gardens. This resulted also in the further development of a new threatened plant species collection created at the Botanic Gardens, featuring Virgin Island and Puerto Rico Bank endemics such as *Croton fishlockii*, *Malpighia woodburyana*, *Eugenia sessiliflora*, *Bastardiopsis eggersii* and *Varronia rupicola*.

Flora inventories were conducted at eleven national parks, including Great Tobago, Gorda Peak, Copper Mine, Fallen Jerusalem, The Baths, Devil's Bay, Spring Bay, Little Fort, Prickly Pear, Shark Bay, Tortola and Cam Bay, Great Camanoe. This represents new information for NPTVI which will inform conservation management at these sites, in terms of the positioning of visitor trails, content for interpretation materials and long term park planning. No comprehensive flora inventories had been conducted within these specific national park sites prior to this Darwin plus project

Kew's species and specimens database was

updated using the information collected during field activities, representing new botanical information that will be made freely available to a global audience as a direct result of this Darwin Plus project. Students, researchers and interested members of the public will now have access to herbarium voucher specimens specifically of BVI species.

The complete development of a draft management plan for forest ecosystems was not possible, but key actions in the management planning process were taken, such as an analysis of stresses and threats to forest habitats based upon stakeholder input. Stakeholders were engaged in ecosystem-based management

planning exercises for forest ecosystems, but the project team realised through this process that there is much more information needed to inform a forestry management plan and that expertise did not reside within the NPTVI or Kew partners, and will require engagement with new partners in the adjacent US Virgin Islands and Puerto Rico, who have recently undergone a similar forest inventory and monitoring system through the International Institute of Tropical Forestry, which has a satellite office in Puerto Rico. Contact was made with the foresters responsible for this work and future collaboration is anticipated as the forest resources in the BVI are an important part of the entire Puerto Rico Bank ecosystem and are currently an unknown entity to our US partners. During this Darwin Plus project, NPTVI staff visited botanist Gary Ray in the US Virgin Islands in February 2015 to begin this cross territory engagement.

This botanical work will continue as a new Darwin Plus project DPLUS 030, "Building systems and capacity to monitor and conserve BVI's flora" began in April 2015, with Kew as the lead partner and the inclusion of colleagues from the nearby island of Puerto Rico, so that there is greater collaboration on the research and monitoring of Puerto Rican Bank threatened species.

Boraginaceae *Varronia rupicola* – conserving a threatened species endemic to the Caribbean

Martin A. Hamilton^{1,2}, Omar Monsegur³, Jose Sustache⁴, Jeanine Velez⁵, Nancy Woodfield-Pascoe⁶, Natasha Harrigan⁶, Marcella Corcoran¹, Sara Barrios¹, Tom Heller¹, Colin Clubbe¹, Kelly Bradley⁷, Chris Malumphy⁸ and Michele D. Sanchez¹ (¹Royal Botanic Gardens Kew, ²Birkbeck University of London, ³U.S. Fish and Wildlife Service, ⁴Puerto Rico Department of Natural and Environmental Resources, ⁵University of Puerto Rico at Mayaguez, ⁶National Parks Trust of the Virgin Islands, ⁷Fort Worth Zoo, ⁸Fera Science Ltd.)



Martin Hamilton with *Varronia rupicola* on Anegada
(Photo: RBG Kew)

Hamilton, M.A., Monsegur, O., Sustache, J., Velez, J., Pascoe, N.W., Harrigan, N., Linsky, J., Corcoran, M., Barrios, S., Heller, T., Clubbe, C., Bradley, K. & Sanchez, M. 2015. Boraginaceae *Varronia rupicola* – conserving a threatened species endemic to the Caribbean. pp 105-107 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Varronia rupicola is a Critically Endangered shrub in the Boraginaceae family endemic to the Puerto Rican Bank in the Caribbean. The species has a very restricted range of distribution as it is only found in isolated areas of western Puerto Rico (PR), southern Vieques and the low-lying island of Anegada in the British Virgin Islands. Very little is known about the species in the wild, its phenology, pollinators, seed dispersal or its habitat requirements. There are no known investigations into its genetics, pollination syndrome, or micro-morphology. This poster reports on research into the species taxonomic placement, biogeography and genetic diversity of wild populations as well as on-going conservation measures.

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Introduction

Varronia, in the family Boraginaceae, is a New World genus of plants with approximately 100 species. *Varronia* are usually multi-stemmed, woody shrubs with mostly serrate leaf margins and condensed inflorescences (de Stapf 2010). Based on ITS1 sequence data and morphological characters, *Varronia* is separate from *Cordia* (Gottschling *et al.* 2005) and recognised as a distinct genus.

The Puerto Rican Bank is a biogeographical unit comprising three countries. Puerto Rico and the US Virgin Islands are both territories of the United States. The British Virgin Islands are one of the UK Overseas Territories. The three political units and separate funding streams have often meant that

baseline survey and species conservation initiatives have been isolated to individual countries with little or no exchange of information. According to Acevedo and Strong (2012), nine species of *Varronia* are native to the Puerto Rican Bank, one of which, *Varronia rupicola*, is endemic and a further two species, *Varronia bellonis* and *Varronia wagnerorum*, are endemic to Puerto Rico.

Varronia rupicola is a Critically Endangered species endemic to the Puerto Rican Bank (Clubbe *et al.* 2003). The species has a very restricted range of distribution as it has been found only in isolated areas of western Puerto Rico (PR), southern Vieques and the low-lying island of Anegada in the British Virgin Islands (Hamilton *et al.* 2015). Very little is known about the species in the wild, its phenology, pollinators, seed dispersal or its habitat

requirements. There are no known investigations into its cytology, phylo- or conservation genetics, pollination syndrome, or micro-morphology. Historically, *V. rupicola*, *V. lima* (from Puerto Rico and Hispaniola) and *V. bahamensis* (Bahamas archipelago) have been confused in the field and reported with overlapping distribution. The current collaborations between the authors aims to resolve the species taxonomic placement and determine the biogeography and genetic diversity of the population to develop conservation management strategies for the species across its distribution.

Material and Methods

Satellite imagery from Google Earth and existing observation and voucher data was used to plan fieldwork which was carried out in 2012, 2013 and 2014 by the authors across the Puerto Rican Bank. Data were recorded using a handheld computer with built-in GPS running ArcPad 10 software © (2012 ESRI Inc.) to visualize digitised spatial features of the survey areas, record presence or absence of the species and record GPS coordinates for samples and points. Data collected were then transferred to Brahms (Botanical Research and Herbarium Management System) 7.4 Software © (1985-2015 University of Oxford) for further processing and export to other packages.

Data gathered were checked for accuracy in Google Earth and supplemental mapping was undertaken based on image interpretation. Maps were produced showing the locations of DNA samples collected, observations made of the species and the areas that require further survey following habitat assessment.

Over 1000 points for *Varronia rupicola* presence/absence were recorded during fieldwork and used to refine survey areas. A total of 464 individual DNA samples were collected (380 wild collected, 84 from *ex-situ* collections) and several morphological and ecological parameters were recorded.

Results

Imagery available in Google Earth was used to assess land use change in southwest Puerto Rico and habitat loss for *V. rupicola* since 1993. Field assessment was undertaken and areas of potential suitable habitat were digitised using an eye altitude of 3.5km. Maps were produced for areas with extant plants recorded during surveys by the authors.

Across the habitat of the extant plants, several areas have experienced land-use change or suffered degradation. For example, between 1993 and 2012, the area around the Ponce Prison in the municipalities of Ponce and Peñuelas saw a loss of 103 hectares of potential suitable habitat for *V. rupicola*. The main driver of this loss was residential housing development followed by quarrying and infrastructure development. Even within protected areas, *V. rupicola* has been impacted by development and maintenance activities.

During our collaborative activities, the authors have observed many threats to the species long-term survival. For example, a previously unrecorded, and non-native insect pest, *Pinnaspis strachani*, was found to be attacking *V. rupicola* on Anegada.

Conclusions and Further Research

Varronia rupicola is extant in Puerto Rico, Vieques and Anegada on limestone substrates. The species faces many threats, including habitat loss, invasive species (attack and competition) and sea-level rise (specifically on Anegada). The US Fish and Wildlife Service (USFWS) listed the species as 'Threatened' (2014b) under the Endangered Species Act and designated critical habitat for the species in U.S. territory (US Fish and Wildlife Service 2014a).

Current research is focusing on the phylogenetic placement, population genetics and ecology of *V. rupicola*. The latter is being undertaken using camera trapping and environmental data collection across the species range.

Collaborative research between Kew and Fort Worth Zoo hopes to understand the relationship between the Critically Endangered Anegada rock iguana *Cyclura pinguis* and *Varronia rupicola*. Initial results indicate that there is a positive relationship between the species on Anegada.

Further research will include a pollination study and restoration trials. Active conservation efforts include seed banking, establishment of *ex-situ* collections (Kew, Puerto Rico and BVI) and *inter-situ* populations (USFWS Cabo Rojo National Wildlife Refuge).

Acknowledgements

Thanks to Bentham-Moxon Trust, UKOTs Programme at the Royal Botanic Gardens Kew, The Emily Holmes Memorial Scholarship and The

Mohamed bin Zayed Species Conservation Fund¹ for their financial support; US Fish and Wildlife Service (USFWS), Puerto Rico's Department of Natural and Environmental Resources (DNER) and the National Parks Trust of the Virgin Islands (NPTVI) for their assistance with legal requirements and fieldwork; Jodrell laboratory staff for their training and advice for genetic analysis.

¹ This work was undertaken with the support of The Mohamed bin Zayed Species Conservation Fund, project no.1225527

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Caicos Pine Recovery Project – an overview

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(Photo: RBG Kew)

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The Caicos pine *Pinus caribaea* var. *bahamensis* is endemic to the Turks and Caicos Islands (TCI) and the Bahamas, where it is the dominant species in the pine forest ecosystem. Pine forests in TCI cover only 13km² and have been under severe threat of extinction in the past decade. A severe infestation by the non-native and pine-specific pine tortoise scale insect *Toumeyella parvicornis* has killed the majority of pines in TCI devastating the local pineyards. High level of scale insect infestation in all pine populations, low number of individuals and threats from sea-level rise in these low-lying islands, called for urgent action to save the Caicos pine, which is an IUCN red listed species (Vulnerable). The Caicos Pine Recovery Project (CPRP) was launched in 2008 and, since then, much has been accomplished, e.g. *ex-situ* pine collections at the TCI CPRP nursery and the Millennium Seed Bank (MSB) in the UK, establishment and monitoring of permanent and restoration plots in the pine forests, pine forest mapping, population genetics data, insect identifications, prescribed fires and local capacity building. In the present phase, funded by the Darwin Initiative and the John Ellerman Foundation, the project is focusing efforts on multi-disciplinary research by experts from the Royal Botanic Gardens Kew (UK) in genetics, mycology, chemical interactions, restoration ecology, seed physiology, horticulture and biogeography to deliver a scientifically underpinned emergency restoration protocol to guide the management and restoration needed to save the Caicos pine forests, enhancing the species resilience to invasive species and climate change.

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The Turks and Caicos Islands (TCI) are a UK Overseas Territory in the Caribbean region, located in the south-eastern end of the Bahaman (also known as Lucayan) archipelago. The country's national tree and only native pine tree is the Caicos pine *Pinus caribaea* var. *bahamensis*, also called the Caribbean pine. This endemic pine is a keystone species in the pine forest ecosystem of the Bahamas and TCI. The Bahamian islands of Abaco, Andros, Grand Bahama and New Providence have large expanses of pine forests

covering c. 2,118 km². However, in TCI, pine forests occurs only in a small area (13 km²) of the islands of Middle Caicos, North Caicos and Pine Cay, where they are highly threatened (Sanchez 2012.)

Signs of genetic differences and isolation by distance between Bahamas and TCI pine populations (Sanchez *et al.* 2014), in addition to regional morphological variations and ecological differences (Sanchez 2012), contribute to the importance of conserving and rescuing the TCI

pine forests from the edge of extinction. In TCI during the past decade, pine forests have been under severe attack by the non-native pine tortoise scale insect *Toumeyella parvicornis*, resulting in the death of the majority of the Caicos pine trees and severe levels of infestation (Malumphy *et al.* 2012; Green 2011). This accidentally introduced scale insect, which is univoltine in its native habitats of the Nearctic regions from Mexico to Canada, is pine-specific and seems to have adapted to many life cycles a year (multivoltine) in the hotter Neotropical Caribbean climate; thus its high numbers and devastating effect to the pine forests in TCI (Malumphy *et al.* 2012). As a consequence of the differences and threats observed, *Pinus caribaea* var. *bahamensis* was assessed as Vulnerable in the IUCN Red List (Sanchez, Hamilton & Farjon 2013).

The Caicos pine regional differences, small and rapidly declining population sizes and high levels of threat in the Caicos Islands required urgent local action to prevent taxon extinction and irreversible loss of the pine forest ecosystem and its ecological services, reduction of biodiversity levels and loss of locally adapted trees and genetic diversity. The Caicos Pine Recovery Project (CPRP) was established in 2008 as a response to this need and with the main aim of researching the Caicos pine and the pine forests in TCI and working together to protect and safeguard this taxon and its habitat for the future. It has been a long-term collaboration between the Royal Botanic Gardens, Kew (Kew) in the UK and the Department of Environment and Maritime Affairs (DEMA) in TCI, as well as many other local and international partners. The CPRP was initially funded by the TCI government and subsequently by the UK Government OTEP (2010-2013) and Darwin Plus (2014-2016) funding schemes with additional funds from the John Ellermann Foundation (2014-2016). The current project 'Caicos pine forests: mitigation for climate change and invasive species' is led by M. Hamilton from Kew with local project management by B. N. Manco from DEMA. A CPRP working group including, amongst others researchers from Kew, DEMA, the UK Fera Science Ltd. (Fera), the United States Forest Service, Sewanee - the University of the South, Tennessee and the Bahamas National Trust, has also been created and maintained throughout the project.

In the past 7 years, an ex-situ pine collection has been established in TCI with trees rescued from the wild and grown from locally sourced seed to provide material for germination and

cultivation protocols, trees for seed collection and re-introduction, and material for research and educational purposes. Currently there are 561 Caicos pine seedlings and saplings growing in the project nursery on North Caicos and another 128 trees growing in the pine seed orchard at the same site. Pine germination and cultivation protocols have been produced at Kew and shared with TCI partners, who are now trained in horticultural skills and able to run the nursery and produce new plants for conservation work. More than 200 Caicos pines produced in the nursery have been planted out on the pine forest restoration sites established on Pine Cay (Hudson 2012) since 2012, with very high survival rates. The Pine Cay Homeowners Association and the Meridian Club on Pine Cay have been very supportive of the project from the beginning. Seeds have also been collected by DEMA's staff and safely stored for purposes of conservation of genetic diversity and future uses at Kew's Millennium Seed Bank (MSB) in the UK. Research on seed longevity is currently being carried out at the MSB to assess seed storage behaviour for the taxon and guide future seed collection and storage.

An early research element of the project involved the establishment in 2010 of nine Permanent Monitoring Plots (Earle-Mundil 2010) on the three islands with pine forests (Pine Cay, Middle Caicos and North Caicos) to observe the effect of removal of broadleaf vegetation and soap sprays on the pine tortoise scale infestation levels, tree health and seedling recruitment. Data are recorded annually and have shown that pine trees benefited from broadleaf removal and soap sprays, as expected (Mark 2012). Caicos pines are adapted to fire (Miller 2005), having a thick and flaky bark (Farjon & Styles 1997). Natural fires in the wet season reduce broadleaf vegetation, increasing gaps and light levels for new pine seeds to germinate, promoting forest regeneration. Two successful prescribed fires have now been carried out on Middle Caicos pine forests in TCI as part of forest management, with expertise from USA fire bosses and fire ecologist from the US Forest Service, Eglin Air Force Base and Sewanee University of the South. The area burned in 2012 is now showing signs of good regeneration with healthy saplings, some resistant to the scale insects. It is very important that potential pests in TCI are identified to avoid the dangers of habitat decline and further loss of biodiversity. The CPRP has been relied on FERA's expert entomologist to identify invertebrates and advice on potential future risks, but TCI's biosecurity is of utmost

importance to prevent another catastrophic infestation such as this observed with the pine tortoise scale insect.

The current Darwin Plus project is focused on researching the resilience of the Caicos pine to invasive pests and climate change to deliver a restoration strategy protocol to guide the future conservation and restoration of the Caicos pine forests. Therefore, Kew researchers are studying healthy and infested trees in TCI to investigate the triggers of resilience and gathering data on habitat mapping, environmental and ecological variables.

Initial research of chemical volatiles from Caicos pine in TCI has already shown some variation in the chemistry of healthy and unhealthy trees and identified main monoterpenes which can be linked to the tree's resistance to pest attacks (Green *et al.* 2015). The adaptation of pines to poor soils and drought is highly dependent on their symbiotic association to ectomycorrhizal (ECM) fungi, which help the trees to obtain supplemental water and nutrients (Smith & Read 2008). DNA sequencing is being used to identify the ECM fungi associated to the roots of the Caicos pine and other ECM plants in TCI. Apart from generalist fungi, truffle-forming fungi of the genus *Rhizopogon* - specific to pine - seem to be dominant in these ecosystems. In areas that no longer have pines, the selection of zones where there is ECM inoculum in the soil could facilitate the adaptation and survival of pine seedlings as part of a future restoration strategy. Another important research focus is examining the correlations between water stress and tree health by measuring biological variables relating to scale infestation, tree size and reproductive output, as fresh water lenses will most likely be negatively affected by current predictions of sea-level rise for the region (IPCC 2013). Further, annual census data, begun in 2010, are being used to parameterise a Population Viability Analysis (PVA) to model future population viability under varying environmental scenarios and thus inform the future restoration strategy.

Population and conservation genetics research is also undertaken to evaluate the remaining Caicos pine genetic diversity in the wild and in the *ex-situ* collection in TCI against baseline data (Sanchez *et al.* 2014), as well as genotyping resistant trees. These data are being used to identify specific trees or areas for future seed collection and help build up a genetically representative *ex-situ* collection for future re-introduction; thus maximising the resilience of the Caicos pine to climate change and pests. Forest mapping was initially done using

satellite imagery, and more recently unmanned aerial vehicles (UAV) or drones have been used to produce models of the current pine forest distribution, estimate levels of forest decline or regeneration throughout the area and indicate possible sites for re-introduction. Additional data on reproductive biology, *i.e.* cone production and seed set, seed germination, infestation levels and some morphological parameters were also gathered for a population viability analysis to feed into the restoration strategy.

The CPRP has also been working in building local capacity through training and practical experience to enable local DEMA staff to collect scientific data, monitor levels of infestation, identify pests and manage the pine forest and the *ex-situ* collection. Exchanging knowledge with the local community and sharing information through schools workshops, media, tours and community meetings have also been a priority throughout the CPRP lifetime. New interpretive panels about the Caicos pine and the project have been installed in Pine Cay and Middle Caicos pine forests, Kew settlement in North Caicos and at the National Environmental Centre (NEC) in Providenciales, the latter also featuring a small exhibition area. Additionally, a new CPRP interpretive trail has been laid out in Middle Caicos pine forest, with planned opening to the public by the end of the year. This exchange of knowledge, multidisciplinary and practical nature of the project, support from the local community, dedication of MSc students, Kew and DEMA staff, UK and international partners and volunteers, continuity of funding and key project members have all been essential to success of the project.

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Species monitoring through a combination of predictive mapping and ground-truthing

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*Katie Medcalf
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Gent, A., Starnes, T. & Medcalf, K. 2015. Species monitoring through a combination of predictive mapping and ground-truthing. p 112 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Observations of species accompanied by accurate spatial location data not only allow the position of that record to be mapped but also allow it to be tied to a wide range of spatially explicit environmental data. These environmental data-sets cover a wide range of parameters, including vegetation, soils, geology, climate, topography and can include historic data as well as modelled predictions about future conditions. Analysis of the relationship between species observations and environmental variables can allow an improved understanding of the ecology of the species and an enhanced knowledge of their habitat needs and can also allow predictions to be made about the occurrence of the species beyond the distribution of recent records.

Both the quality and availability of environmental data are increasing, greatly aided by improvements in technology and investment in remote sensing, and we are seeing improvements in Geographic Information Systems (GIS) capabilities and research that is improving both the inferential and predictive power of modelling. However, there still remains a significant need for field-based research both to provide data for models and to test their predictions. Models are only as good as the data on which they are based, requiring sufficient recent data on species' locations, ideally including both 'presence' and 'absence' data with high levels of spatial precision. Field work is therefore needed to collect and maintain this data set. Even with good data, modelling can draw spurious conclusions, may not include all factors (such as the presence of competitor or predatory species or losses through disease or in-breeding, etc). Therefore 'reality checking' is needed and models will need ground-truthing to make sure they work and also to track the fate of a species within its habitat.

We believe it is the combination of both field work and remote sensing data that provides the future for species status monitoring – allowing expedient analysis and cost-effective deployment of resources. We also advocate that this combination can provide a valuable stimulus of volunteer involvement, especially for those looking for a rounded 'scientific experience'. Undoubtedly there is huge satisfaction on seeing animals in their natural habitats. GIS and modelling aids the analysis and understanding of the broader context in which species survive and thrive. It also provides a powerful framework for developing scientific enquiry.

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Akrotiri Marsh Restoration: a flagship wetland in the Cyprus SBAs funded by Darwin Plus

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Apostolidou, M. 2015. Akrotiri Marsh Restoration: a flagship wetland in the Cyprus SBAs funded by Darwin Plus. pp 113-116 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Akrotiri Marsh (also known as Fassouri Marsh) is part of the Akrotiri wetland complex. It is a Ramsar site, an Important Bird Area (IBA) and a Special Protection Area (SPA), equivalent to the EU designation, according to the mirror law (26/2007) in the Cyprus Sovereign Base Areas (SBAs). The marsh, which covers an area of around 150 hectares, has been unmanaged for the last 20 years, resulting in overexpansion of reeds and consequent loss of bird and plant diversity. To restore the area and its biodiversity, BirdLife Cyprus as a lead partner in collaboration with the SBAs Administration (SBAA), the Akrotiri Environmental Education Centre and RSPB (BirdLife partner in the UK) are implementing a conservation project, funded by the Darwin Initiative through UK Government funding (Darwin Plus, the Overseas Territories Environment and Climate Fund). The project's duration is 2 years, between April 2015 and March 2017.

The project will deliver an ecosystem-based conservation project in combination with public engagement actions. Through habitat modification and water management, the project will create a mosaic of habitats and increase species diversity for threatened species such as the spur-winged lapwing, the black-winged stilt and ferruginous duck. Opening up the reedbed will provide also increased opportunities for grazing livestock, a traditional activity at the site, contributing to longer-term reed management. There will also be enhanced facilities for birdwatching tourism and opportunities for handicraft production. Baseline studies, including for the native killifish, birds and flora, will provide useful indicators to monitor change and project impact.

The project will significantly assist the SBAA in its goal to improve wetland management. The project also aims to provide increased economic opportunities for local people through the promotion of traditional practices like livestock grazing and basketry, acting as a model project for future work. Also, increased visitation by birdwatchers and other interest groups, like school groups experiencing innovating educational activities, is expected to bring more benefits for the local village.

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Introduction

Akrotiri Marsh (also known as Fassouri Marsh) is part of the Akrotiri wetland complex. The complex is a Ramsar site, an Important Bird Area (IBA) and the equivalent of a Special Protection Area (SPA) of the EU Birds Directive, according to the mirror law (26/2007) in the Cyprus Sovereign Base Areas (SBAs). The marsh, which covers an area of around 150 hectares, has been largely

unmanaged for the last 20 years resulting in overexpansion of reeds (*Arundo donax* and mainly *Phragmites australis*) and consequent loss of bird and plant diversity. To restore the area and its biodiversity BirdLife Cyprus as a lead partner, and in collaboration with the SBAs Administration (SBAA), the Akrotiri Environmental Education Centre and the RSPB (BirdLife partner in the UK) are implementing a conservation project.



Little bittern Ixobrychus minutus is a rare breeder in Cyprus and Akrotiri marsh is possibly one of the best sites island wide for this breeding species.

© Michael Gore



Ferruginous duck Aythya nyroca is a species of global conservation concern, and Akrotiri Marsh is one of the few sites where the species has been recorded nesting in Cyprus. Management actions are expected to benefit the species. © Stavros Christodoulides

The 2-year project (April 2015 to March 2017) is funded by the Darwin Initiative through UK Government funding (Darwin Plus, the Overseas Territories Environment and Climate Fund).

Project aim

The project's primary aim is to restore Akrotiri Marsh to a mosaic of habitats leading to restoration of species diversity. Through targeted project actions the aim is also to provide increased socio-economic opportunities for local villagers.

Project actions

The project will deliver ecosystem-based conservation actions in combination with public engagement actions.

A combination of landscaping works, water



The spur-winged lapwing Vanellus spinosus, which is an Annex I species of the EU Birds Directive [2009/147/EC], has been recorded nesting on site. Disturbance is an inhibiting factor for the breeding of this species.

© Dave Nye

management actions and management of vegetation with grazing animals aims at habitat modification to create a mosaic of habitats and increase species diversity while improving conditions for priority breeding species such as the spur-winged lapwing *Vanellus spinosus*, the black-winged stilt *Himantopus himantopus* and the ferruginous duck *Aythya nyroca*. Opening up the reedbed will also provide more space for grazing and therefore increased opportunities for livestock keeping, a traditional activity at the site. Grazing is a key management action that will also contribute to longer term reed management.

The project will produce a series of baseline studies: a topographical survey, a productivity study and population assessment for key breeding birds and a study on native killifish *Aphanius fasciatus*. The baseline studies will assist in monitoring change and project impact. During project implementation, key variables will be monitored, *i.e.* water quality, bird and plant species richness and abundance. To ensure the sustainable long-term management of the site, a water management regime and a site management plan with clear objectives will be prepared.

To engage the local community and to spread the message for nature conservation to a wider audience, the project foresees the creation of enhanced facilities for birdwatching tourism, *i.e.* observation tower, walkway for visitors and information material. Opportunities for traditional handicraft production will also be enhanced and promoted to support the local community.



*The open area, ideal for grazing and many plant and bird species, has shrunk significantly over the last 20 years, due mainly to the expansion of reeds *Phragmites australis*. The project foresees landscaping and water management works that will increase the habitat diversity on site. © Melpo Apostolidou*



In recent years, grazing animals on the site have been reduced, allowing the expansion of reeds. The project will use grazing as a tool for habitat management and will promote grazing to local farmers through the purchase of the Cyprus breed of cattle. © Melpo Apostolidou

Summary of breeding population data for IBA qualifying wetland species at Akrotiri IBA

Species	Cyprus breeding population (2013 estimate)	Breeding population at Akrotiri IBA (2013 estimate)
Ferruginous duck <i>Aythya nyroca</i>	1-6 breeding pairs	1-5 breeding pairs Akrotiri wetlands complex: recorded breeding only at Akrotiri marsh, Zakaki pond and Bishop's pool. 1st confirmed Cyprus breeding record was in 2005 at Akrotiri marsh.
Spur-winged lapwing <i>Vanellus spinosus</i>	40-60 breeding pairs	1-4 breeding pairs Akrotiri wetlands, with Akrotiri marsh being one of the best sites for the species
Black-winged stilt <i>Himantopus himantopus</i>	50-200 breeding pairs	2-55 breeding pairs Akrotiri wetlands – numbers vary widely according to suitability of water levels

Expected results

The project will significantly assist the SBAA in its goal to achieve sustainable wetland management and set an example for the future management of other wetlands in the Akrotiri complex. The project aims also to provide increased economic opportunities for local people through the promotion and preservation of traditional practices like livestock grazing and basketry, acting as a model project for future work. Also, increased visitation by birdwatchers and other interest groups, like school groups experiencing innovative educational activities, is expected to bring more benefits for the local village.

Discussion

Much of the discussion addressed the conclusions and recommendations. If such items are adequately reported in the Conclusions and Recommendations section later in these proceedings, they are generally not repeated here. Instead, this section draws out some other aspects for which amplification may be useful, on of the discussions and ideas put forward for consideration.

International agreements

- With so much technical language around MEAs, how do we make it meaningful for people on the ground and how do we hold governments to account?
- How do territories which are non-signatories justify to governments the need to sign up?

Because the language of agreements is so obscure, often people are not aware that some of the things they are doing are fulfilling commitments as well. Gradually forming a bank of evidence is important, and is also useful if looking for funding.

Biodiversity Strategic Action Plans (BSAPs) are a good way of measuring progress on implementation of *e.g.* Aichi targets, as well as highlighting gaps.

A matrix showing accomplishments of the Cayman Islands under different agreements was created. This helped at ministerial level as there was not necessarily a good understanding of the requirements and the process of MEAs.

Could the Forum fulfil the role of painting a picture of MEAs, by creating a document that puts them into layman terms with examples of Territories that have succeeded? This would be a good teaching tool for Territories to deliver to *e.g.* Ministry

Invasive species

- Should we be tapping into the private sector for funding, especially for attractive projects such as eradicating giant mice?

The use of structured thematic discussions – *e.g.* invasive species – was identified as a useful addition to Working Group meetings as this would encourage a longer term perspective. Perhaps the Forum could integrate this into their workings more widely.

Sharing experiences, expertise and resources as NGOs can lead to significant cost-savings when undertaking projects, and projects can be completed more efficiently and more cheaply than if undertaken by government. The key is talking about common objectives, incentives and ideas amongst organisations.

The costs for the rat eradication in South Georgia seems staggering but, if communities have the desire to do something similar, then there is the potential for cost-saving and working together to reduce costs. For example, using the same helicopters and crew for further attempts to eradicate rats on Henderson.

Biodiversity data

Motivation of people who collect the data needs to be looked at as a means of exploring the possibility of obtaining free data.

Encouraging people in the field to upload their data on to open access sites is all well and good, but often researchers do not have enough time to do this. Organising a collective effort to achieve this would be better – perhaps through the Forum?

Data collection in a more informal context should not be discounted, *i.e.* in between periods of formal fieldwork, what about what is seen on a day-to-day basis?

The Isle of Man looked at the UK Indicators but decided this was not a good model for small places. Perhaps a set of indicators is needed. There had been some work on biodiversity indicators across OCTs. JNCC could provide some information on this.

Must not discount the private sector as a source of data - there is a lot of information in the private sector that they may be willing to share.

Quality assurance around data needs to be considered. There need to be guidelines around data handling and collection to create standards and controls for researchers.

Crown Dependency: absence of data on common species is a problem, *e.g.* rats, a particular problem with lack of data on small mammals. How to monitor data these data on limited staff resources is also difficult. The appropriateness of data collection is also problematic – more guidelines need to be put out for people collecting the data, detailing what is required it make it useful for practitioners.

The integrated biodiversity assessment tool is an initiative by UNEP WCMC, Conservation

International, BirdLife International and others, a one-stop shop for biodiversity data with a global scope

There are considerations when uploading data to a public forum, such as being careful with geographic and location information for newly discovered/described species or those which could see a commercial benefit (*e.g.* exotic pet trade).

Capacity and resources use

The Forum exists to link and exchange information across Territories, and adjusts its involvements according to Territories' needs.

Guernsey/Jersey Biological Record Centre has created a unified policy on release of data for certain species that are deemed at potential risk of inappropriate commercial exploitation. This ensures that data on these species will not be released to the public forum.

Need to concentrate on actions as well as data – this is the key to conservation ultimately.

Has the Forum given thought to Strategic Goal A of Aichi Targets Target 2, and how we can get governments to engage? National accountability is something that this group (the Forum) specifically can help with as there is nobody leading on this. Showing the value of our biodiversity and natural capital in our national accounts, for example, would be very valuable, but there is no discussion being had on these points. The Territories need discussion and attention of these points since they are Aichi Targets and 2020 is only 5 years away. The Forum is key to promoting this and encouraging the discussion, particularly with the UK Parliament's Environmental Audit Committee.