

The role of native species nurseries in mitigating threats from invasive species: case studies from UK Overseas Territories

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Abstract

Many invasive species have been introduced via the horticulture trade during years of plant exploration and movement of plants around the world. Pests and diseases often piggy-back on these movements and find new hosts and prosper. Kew's UK Overseas Territories Programme is developing strategies with Territory partners to address these threats. The development of native species nurseries that supply plants for conservation actions that mitigate invasive species threats are yielding positive results. Three case studies are presented:

- St Helena: The St Helena Government is expanding the capacity of its nursery to provide plants of native species for direct replacement of invasive plants as they are removed in an ambitious restoration programme.
- Cayman Islands: The native species nursery at Queen Elizabeth II Botanic Park is growing the 'Cayman Collection', thirty native species for sale in an attempt to reduce the number of exotic species used in landscaping, many of which are invasive or showing invasiveness potential.
- Turks & Caicos Islands: Turks & Caicos National Trust has established a pine nursery to grow an *ex situ*, pest-free collection of the national tree, *Pinus caribaea* var *bahamensis*. The wild populations of this endemic variety are being decimated by an invasive scale insect and may become locally extirpated.

Keywords

Cayman Islands; conservation; restoration; St Helena; Turks and Caicos Islands;

Introduction

The UK Overseas Territories (UKOTs) comprise 16 former colonies that retain their direct British links and are part of the United Kingdom and they are British citizens. Including many remote oceanic islands, the UK Overseas Territories contain unique species and habitats and by far the most important UK biodiversity is located in the Territories. Kew's UK Overseas Programme is helping UKOTs implement the Global Strategy for Plant Conservation (GSPC). This paper illustrates some of the approaches to tackling invasive species and helping achieve Target 10 (GSPC, 2002).

Like most biodiverse regions of the world, UKOT biodiversity is being threatened by habitat loss and fragmentation, invasive alien species, development and the increasing threat of global climate change (Millennium Ecosystem Assessment, 2005). However, if serious inroads are not made into tackling habitat loss, and in particular invasives, in some Territories there will be no biodiversity left to be impacted by climate change which will become a social issue and not a biodiversity one.

Native species nurseries and invasives

Kew is supporting developments in key botanical infrastructure in the UKOTs. These include the establishment of native species nurseries working with local Botanic Gardens, National Trusts and Government Departments. This paper illustrates three contrasting invasive species challenges where the development of native species nurseries has been a key element in tackling the invasive threat. These are drawn from current projects in St Helena in the South Atlantic, and the Cayman Islands, and the Turks and Caicos Islands in the Caribbean.

The remote island of St Helena has suffered from the negative impacts of invasive species for centuries ever since the Portuguese discovered St Helena in 1502 and left goats there as a source of fresh meat for passing sailors. Over-grazing by goats, now largely removed, has left much of the lowlands as eroded Crown Wastes. The Peaks were hugely modified towards the end of the 19th century by the commercial planting of *Phormium tenax* (New Zealand flax) to provide an economy based on the fibre extracted from the flax and used for a range of products including UK mail bags until the market collapsed with the invention of lighter, waterproof plastic derivatives in the 1960s. This has left St Helena's unique flora on the edge of extinction; six of the approximately 50 endemic plant species are already thought to be extinct, many species are down to single individuals and others have a very restricted distribution (Ashmole & Ashmole, 2000; Cronk, 2000).

The first challenge was to get the native and endemic flora into secure *ex situ* conservation and the Endemics Nursery at the Agriculture and Natural Resources Department's headquarters at Scotland was established to do just that (Figure 1). The current project funded by the UK's Overseas Territories Environment Programme (OTEP) is helping increase the capacity of this nursery through providing both staff and training opportunities, both at Kew and in St Helena, as well upgrading nursery facilities (UKOTCF, 2008). Virtually all the key endemic plants from both the dry lands and from the moist cloud forest of the Peaks are now in cultivation and being propagated in large numbers for re-introduction.

Lessons are being learnt from earlier restoration attempts which failed. For example when removal of flax from the Peaks was first undertaken the time between removal and plantings with native species was too long, allowing the establishment of even worse invasive species. *Austroeupatorium inulaefolium* (whiteweed) is an insidious invasive composite shrub, native to Central and South America and Caribbean islands that produces huge numbers of seed and a long-lived seed bank and is a much bigger problem than flax.

A major seed-collecting programme is underway (Figure 2). Seed is being collected on St Helena and excess seed stored locally using a low-tech sealed drum containing silica gel developed by Kew's Millennium Seed Bank Project. This provides a simple and reliable way to dry seeds which can then be stored in sealed foil packs in a fridge until they are needed for sowing in the nursery or for direct sowing in the field. Seeds are also being collected from St Helena species in the living collections at Kew for repatriation. This is particularly important for those species that produce little or no seed on the island. For example, *Melissia begoniifolia* (St Helena boxwood) which is being hand pollinated and 13,000 seeds have been collected this season to be sent to St Helena. This is critical as the boxwood is extinct in the wild and the few *ex situ* individuals on St Helena were not producing seed.

The current approach to restoration is to carefully clear invasive plants from specific areas only when there are sufficient supplies of a suitable range of native/endemic

species available in large enough numbers to plant out and get established to out-compete invasives. Early indications are that this approach is working and the ongoing challenge is to produce enough plants in the nursery over a sustained period to establish functional native habitats (Figure 3). The nursery management plan is now producing thousands of plants, many of which have never been in cultivation before. Resources, including sustained long-term funding remain challenges for the continuation of this work.

The challenges in the Cayman Islands (CI) contrast starkly with those in St Helena. The Cayman economy, based on the finance industry, has been vibrant and there is a lot of development. Landscaping is an important component of new developments and a norm is to use plants imported from Florida. There are no restrictions on species and there are minimal quarantine regulations. Consequently several serious invasives have been introduced which threaten native habitats.

Working with the CI Department of Environment (DoE) and the Queen Elizabeth II Botanic Park (QEIBP) in a Darwin Initiative funded project, the impact of invasives and dealing with these threats was a central component (Darwin Initiative 2005). A typical example is the coastal shrub, *Scaevola taccada*, native to the Indo-Pacific and introduced as a landscaping plant and used widely for hedging. *Scaevola taccada* has escaped cultivation and is converting the diverse, native coastal dune vegetation into a monoculture of this fast-growing invasive. Many native species are in decline, including the native *S. plumieri*, which is on the verge of local extirpation. The identification of native species that can be used as native alternatives to non-native invasive species is an important role for botanic gardens. For example the native silver buttonwood (*Conocarpus erectus* var *sereceus*) makes a good substitute hedge in new housing developments and has none of the problems associated with using *Scaevola taccada*.

The most recent development is the establishment of a native tree nursery at QEIBP to grow native species for landscaping as a response to the current usage of non-native and in some cases invasive species. This has been accompanied by a high profile advertising campaign to encourage the use of native species for landscaping (Figure 4) and the development of the 'Cayman Collection' – 30 native species specifically chosen to meet the current landscaping needs. Attractive plant labels have been produced with growing instructions and environmental information (Figure 5). The Cayman Collection has been a great success and it is a challenge keeping up with demand. QEIBP are negotiating with the Government for extra land to expand production and also exploring links with private enterprise to diversify production.

The plant labels, specifically designed for this project have been a great success, appealing to a community interested in gardening and landscaping and we are developing similar 'local native collections' in other projects, for example, in the Falkland Islands. QEIBP received some large orders including one to landscape the new airport expansion on Grand Cayman. However, the economic downturn has significantly affected the Cayman Islands and the airport expansion has been postponed. A lot of businesses including the landscape trade have cut back significantly and the long-term impacts are not yet known, but sales are very slow at the Nursery.

In the Turks and Caicos Islands (TCI) the challenge is a very specific invasive pest issue. The national tree of TCI is the endemic *Pinus caribaea* var. *bahamensis* (Caicos pine) and is suffering attack from an invasive scale insect first observed in 2005. This has been identified as *Toumeyella parvicornis* (Pine tortoise scale) which

is a well known species in North America on the Pinaceae family, but this is a new host record and the first record for the Caribbean region. The course of the infestation has been rapid and five years on most of the TCI pineyards are populated with dead and dying pine trees (Figure 6).

TCI's pineyards have been mapped and fieldwork is documenting the extent of the scale's spread (Figure 7). A pine recovery plan has been formulated and the first phase of its implementation has been funded by the TCI Government. This included establishing an *ex situ* collection of Caicos pine to secure the species in cultivation and to build up stocks for potential reintroduction and restoration. To house the *ex situ* collection a new pine nursery has been built and a comprehensive Caicos pine collection programme started. Seed are collected where possible, but cone production has been severely curtailed by the disease. In addition seedlings have been rescued (Figure 8). Those that show signs of infection are treated with a soap wash to remove the scale. There is now a healthy *ex situ* collection in a functioning pine nursery and plans are underway for some experimental re-introductions on Government land allocated to the project for trials. The next year will be critical and funding has been secured for the next phase (UKOTCF, 2010).

Conclusions

These three contrasting case studies illustrate the range of invasive threats to unique biodiversity of the UK Overseas Territories. The invasive species threat continues and is getting worse, so a key requirement is for better bio-security to prevent new establishments as well as containing existing ones. Native species nurseries are proving vital in the fight against invasives, but there is a need for sustained funding and greater capacity to really ensure success. There is a need to up-scale production of native species in order to embark on large scale habitat restoration and species recovery. There is a great opportunity to establish small commercial nurseries on islands to work with the local Botanic Garden, National Trust, or Government Department which can stimulate the local economy, whilst making a positive contribution to conservation – a win-win situation. The funding model is a challenge, but we have the techniques and know-how to tackle invasive species and pull the pendulum back in favour of native communities.

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List of Figures

Figure 1: St Helena's Endemic Species Nursery

Figure 2: Collecting and storing seed of St Helena's Endemic Flora

Figure 3: Invasive clearance and reintroduction of endemic species in St Helena

Figure 4: Promoting native species landscaping in Cayman Islands

Figure 5: The Cayman Collection

Figure 6: Impacts of the invasive pine tortoise scale in the Turks and Caicos Islands

Figure 7: Mapping TCI's native pineyard habitats

Figure 8: Collecting *Pinus caribaea* var. *bahamensis* seeds and seedlings for the pine nursery in TCI

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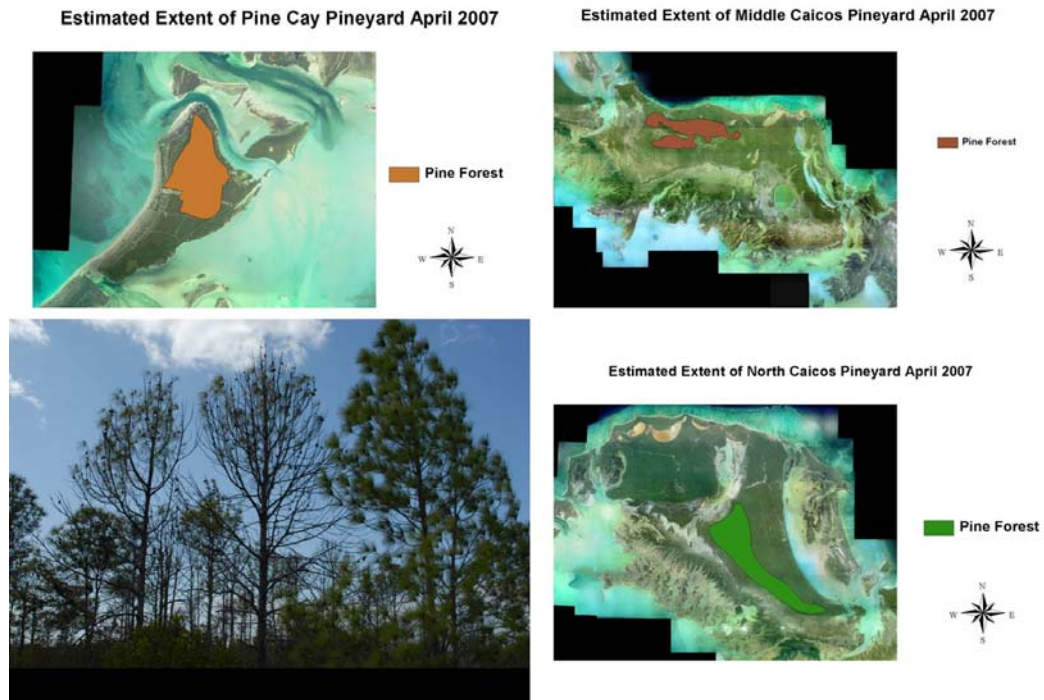


Figure 8: Collecting *Pinus caribaea* var. *bahamensis* seeds and seedlings for the pine nursery in TCI

