

FRIENDS OF THE SCOTSMAN /

# Helping a humble mountain herb to beat the effects of climate change

The most pressing global challenge of our time is arguably climate change. Central to addressing this is the worldwide plant conservation undertaken by the Royal Botanic Garden Edinburgh (RBGE) and our partners.

From the Congolese forests, where monitoring of plant species underpins rainforest conservation, to Nepal, where the description of new species, coupled with economic and social botany, is helping communities benefit from sustainable plant resources, we are making a difference. But, if charity begins at home, what is RBGE doing for Scotland?

Scotland's climate is projected to change. Already it appears warmer overall, with shifting patterns of rainfall. The challenge for Scotland's plants is the added effect of climate change alongside other pressures.

This is exemplified by RBGE's work on *Cicerbita alpina*, the alpine blue sow thistle, a tall herb characteristic of mountain grasslands. Highly palatable to grazing animals, it has become restricted to just four small mountain ledges in Scotland beyond the reach of deer and sheep.

Management of these animals connects directly with climate change, because smaller and isolated plant populations have lower amounts of genetic diversity, which reduces the ability of species to evolve and adapt to environmental change. New populations of alpine blue sow



**Dr Christopher Ellis reports on local actions to protect native plants from global warming**

thistle, with increased genetic diversity, are being propagated at RBGE's Nursery and translocated back into Scotland's landscape. The key lesson is that local effects – such as grazing – can have implications for a species survival under climate change.

Aside from flowering plants, much of Scotland's importance in international conservation stems from its richness of algae, mosses, liverworts and fungi, including lichens, which are archetypal in our landscapes, from the highest mountains to coastal rainforest.

What these humble species lack in stature, they make up for in importance; recent estimates suggest they capture around half of the nitrogen that later becomes available for plant growth and around 10 per cent of primary productivity overall. But, they are also microhabitat specialists and they occur under subtly contrasting conditions across the landscape.

Some species are associated only with patches of late-lying snow in the mountains and are threatened, therefore, by climate change. RBGE's work includes discovering new spe-

cies in these snowbed habitats so as to protect them before they disappear, with monitoring to understand the speed with which these habitats are changing. The challenge is to capture the importance of these high mountain areas within conservation policy at a time when they are shifting in character. This makes the practice of defining and then achieving conservation goals extremely difficult.

Perhaps the greatest test is reserved for coastal rainforest, part of a globally-rare temperate rainforest, covering less than one per cent of land surface in places such as Chile, New Zealand and, indeed, Scotland. Its very existence is sustained by particular climatic conditions; mild temperatures throughout the year, and plentiful moisture.

RBGE is using its three regional gardens as experimental sites to understand the response of rainforest species to climate change. Logan, in Dumfries and Galloway, is wet and warm while Benmore, in Argyll, is wet and cool and Dawyck, in the Borders, is dry and cool. As such, they provide sufficiently different



↑ The Royal Botanic Garden Edinburgh is working hard to reintroduce *Cicerbita alpina*, the alpine blue sow thistle, to Scotland's landscape, where it has become endangered because of grazing

climates for monitoring the growth of rainforest lichens.

Lichen growth is measured monthly and compared to the climate. The variability of climates across the regional gardens is sufficient that we can estimate the effects of future climate change, including the potential health of lichen populations in Scotland's rainforest over the com-

ing decades. Then, we can start to understand how we might manage our woodlands now and in the future.

Many of Scotland's woodlands have been simplified because of past management such as coppicing for charcoal or oak bark to be used in tanneries. By increasing the complexity of these woodlands, such as diversifying the types, ages, and structures of

trees, we can create a wider variety of microclimates, giving lichens the opportunity to colonise and survive.

Our future wellbeing is intimately linked to the fate of plants and fungi. Climate change issues reach across land management options – grazing, woodland management and more – since local actions become part of our global response. Argua-

bly, all conservation, from the eradication of invasive non-native species, to habitat restoration, is a part of the response to climate change. Each will seek to provide nature with as much resilience as possible and we can all play a part. Dr Christopher Ellis is head of cryptogams, Royal Botanic Garden Edinburgh.



## Managing land for game birds helps all species survive and thrive over winter

Dr Dave Parish says responsible farming gives wildlife a boost

It's autumn and, whilst we may still have a few days of sunshine left, the palette of the countryside is changing.

Standing crops have been harvested, bales are wrapped and stacked, swallows and summer visitors will be heading south and other species will replace them, stopping off to plunder berries in woods and hedgerows as they migrate.

Pigeons in flocks are hovering up the grain that the combines have left; rooks are gathering in numbers in the high trees. Many species, both game birds and songbirds in gardens and farms are facing the prospect of winter and the associated challenges to survival.

The modern countryside is a harsh environment for wildlife, with scant opportunities for food and shelter

except where farmers have specifically made provision for them. This may be because of an interest in game birds, or through a support scheme where public money compensates farmers for giving over some of their ground to wildlife habitats.

As we head towards Brexit we now have a good idea from the recently published Agriculture Bill that future measures to support farmers south of the border post 2021 will be built around care for the environment. Implicit in any future support must be payment for farming for food but the Westminster strategy is definitely towards delivering 'environmentally responsible farming'.

GWCT has always advocated that if manage your land for the benefit of game species then other birds and wildlife will benefit too. So,

when we count wild grey partridges, as we are doing at the moment, we are also noting other species taking advantage of measures put in place on farms to protect and provide for some of our most challenged birds and mammals.

To the lay person, seeing that a field has not been ploughed or planted right up to the hedge or the dyke might make them think that the farmer took an early lunch, or that they are taking the subsidy but short changing the system. In fact we want to see margins left, hedges cut but on a planned basis and never 'short back and sides' at once, unproductive strips and headlands allowed to stand, or better still planted with a mix to benefit birds and wildlife.

We are working hard on the science to establish what different bird

species need for food, shelter, and nesting cover and, come spring, for rearing their chicks. We know that managing the farm for game will deliver outcomes for farmland birds and songbirds too.

This is the basis for the Interreg North Sea Region-supported PARTRIDGE project, which aims to show how grey partridge measures can boost wildlife at demonstration sites across northern Europe. We hope this will lead to improvements in support packages available to farmers to give wildlife a much-needed boost.

If we can provide for these species all year round we will come far closer to safeguarding their future. So, for example, the wild grey partridge requires suitable habitat, enough food and tolerable levels of predation for success and when farmers plant

cover crops, provide supplementary feed and perform even basic predator control they can meet these needs.

Other factors might include hedge maintenance and tree planting, but good habitat management for wildlife means planting and managing vegetation with appropriate care to provide a sound environment.

Where these interventions are planned and delivered then they can have staggering results – for example one study of game crops in Scotland recorded up to 100 times as many songbirds per hectare in them compared to stubble, set aside or conventional crops, with another study showing 15 times more butterflies and 40 times more bumblebees.

Where an arable enterprise will want to improve their yield by killing weeds with chemical treat-

ments or killing insects with insecticides, this takes away a valuable food source. But this can be offset by treating areas around fields, margins and headlands with fewer or selective chemicals allowing more wildflowers and arable weeds to flourish, and the associated pollinators and pest-predators, which can actually improve crop yields.

At this time of year farmland birds need food and shelter, so plants that stand through the winter and retain their seeds through spring are ideal.

In Scotland we have been trialling kale, triticale, mustard, wheat, oil seed rape and quinoa benefiting many species including linnet, bullfinch, reed bunting, house sparrow, tree sparrow and song thrush. Any future payment regime we hope will ensure that greater levels of this type



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