

REPORT OF A WORKSHOP ON CONSERVATION OF FOREST GENETIC RESOURCES IN THE UK

Held at the Millennium Seed Bank, Royal Botanic Gardens Kew at Wakehurst Place, West Sussex, on 26th April 2018

CONTEXT AND ISSUES

The ability of UK woodland and trees to meet the present and future societal and environmental challenges depends on the availability of rich diversity between and within tree species. Genetic diversity – variation among individuals and populations is needed in order to ensure that tree species can survive, adapt and evolve under changing climate conditions and other drivers of change including pests and diseases. Maintaining genetic diversity also maintains the broadest possible options for future tree breeding, including the option to develop traits which are not currently of economic value.

Yet this vital genetic resource is poorly known, undervalued and threatened by direct and indirect human impacts. Whilst various agencies are taking steps to address these challenges, work to date has been patchy, on a relatively small scale and insufficiently joined up or compatible in approach.

A Strategy for UK Forest Genetic Resources could provide co-ordination in order to facilitate collaboration to address these issues. It would raise the profile of the need to better understand and protect our forest genetic resources and enable key players to develop joined -up action to identify, understand and conserve them. The Strategy would be joined up with, and supportive of, wider actions to maintain and increase diversity and resilience of UK FGR in the landscape

PROGRESS

Following a successful workshop in March 2017, a small group was formed, comprising Clare Trivedi (MSB), Stephen Cavers (CEH), Joan Cottrell (FR), Jo Clark (FTT), Nick Atkinson (WT). This group used the outcomes of the workshop to produce a draft strategy document, which has been circulated widely to stakeholders for comment and feedback. All comments have been taken on board and a final draft Strategy has been produced

WORKSHOP AIMS

This workshop will aim to:

- present the draft Strategy noting major stakeholder inputs
- agree a governance structure and membership for a FGR Strategy
- identify the content for an action plan to implement the Strategy, including identifying appropriate timeframes, implementing organisations and funding sources.

WORKSHOP PROGRAMME

9.30 Registration and Teas/Coffees

Session 1 Chaired by Kathy Willis

10:00-10:10 Welcome (Kathy Willis, RBG Kew)

10:10-10:30 Presentation of FGR strategy & response to stakeholder feedback (Clare Trivedi)

10:30-11.10 Discussion

Coffee Break

Session 2 Chaired by Bruno Fady

11:30-11:50 Presentation of outline Action Plan (Stephen Cavers)

11.50-12:50 Interactive session x3 on Action Plan

Lunch

13:40-14:20 Interactive session x 2 on Action Plan

14:20-15:20 Plenary Session on Action Plan

15:20-16:00 General discussion on membership and next steps (Strategy Drafting Group)

16:00-17:00 Optional tours of the Millennium Seed Bank

Rapporteurs for interactive sessions as follows:

Research: Stephen Cavers

In situ conservation (GCUs): Joan Cottrell

Ex situ conservation: Clare Trivedi

Collaboration for Change: Nick Atkinson

Communicating for Change: Jo Clark

SUMMARY OF DISCUSSIONS

Session 1

Clare Trivedi gave a presentation which outlined the history of this process to date, outlining how, following the first workshop, a drafting group had been formed and produced a draft Strategy for UK FGR, which had been widely distributed for consultation in December 2017. Her presentation focused on the feedback from that discussion, how it had been used to inform the new text, and to clarify the purpose and content of the new draft Strategy.

Feedback from the consultation had fallen into three key areas; The governance and process for the Strategy; the Scope of the Strategy and the Format for the Strategy text.

As a result the latest draft of the Strategy clearly included Northern Ireland in the Strategy, with agreement to collaborate with the Republic of Ireland Strategy for FGR. Sections on Collaboration for Change and Communication had moved up above Research, In situ and Ex situ conservation to emphasise their importance. The Strategy scope in terms of species and woodlands covered was highlighted on the first page of the document.

This presentation is available by request.

Discussion

There was a range of points made about the potential for registering in situ Gene Conservation Units in the UK. There was comment on the need to engage with landowners and woodland managers via organisations such as the CLA, Royal Forestry Association and National Trust. It was noted that the existing process for nature reserves such as Natura 2000 and NNR sites already includes objectives that support natural regeneration of woodland sites and so such sites might largely meet the criteria to be designated as GCUs and this led to further discussion and questions around the criteria for GCUs and the management implications (including costs) for such sites. Noted that it is possible that any monetary costs might be borne by future agri-environment grants that might replace the current grants after Brexit. It was reported that to meet EUFORGEN requirements only one or two GCUs per species would be required in the UK and that these could easily be identified through existing data produced via GENTREE and UKNTSP. It was also noted that GCUs already exist in Ireland, but that there isn't legislation to afford them formal protection.

Noted again the Forestry Commission note, written by Jason Hubert and Joan Cottrell, which gives clear guidance on the criteria for a GCU, according to the EUFORGEN system

[https://www.forestry.gov.uk/PDF/FCPN021.pdf/\\$FILE/FCPN021.pdf](https://www.forestry.gov.uk/PDF/FCPN021.pdf/$FILE/FCPN021.pdf)

The workshop responded to the points raised by Clare Trivedi's presentation with regard to the scope of the document. Some attendees thought that the scope of the Strategy, in terms of the type of species and woodlands covered still was not clear. It was commented that much of the text in the introductory section might give the impression that the Strategy deals with productive forestry and introduced commercial species, whereas in fact the scope is narrower.

There was consensus that it was best to keep the scope focused as currently defined:

‘The Strategy aims to understand and protect genetic diversity that is adapted to UK conditions, especially that which is not found in other countries. It will therefore focus on native species and introduced species where naturalisation has taken place or where important varieties or landraces have been developed in the UK’.

It was agreed that the priority task is to understand and conserve, including through use, genetic resources that are unique to the UK, and that this is a significant but achievable level of ambition. It was noted that there is already momentum behind the initiative as thus planned and to attempt to redefine the task would risk stalling progress. It was also noted that the commercial forestry sector is comfortable with this mandate. However, it was mentioned that we should not assume non-native genetic resources widely used in UK commercial forestry are adequately conserved in their countries of origin. Agreed that the currently defined scope should not be narrowed to cover only native species because widespread naturalised species such as larch, and those with landraces unique to the UK, were also vital UK resources.

There was a suggestion that it would be helpful if the Strategy text included further information on how this Strategy fits with other initiatives in relation to UK FGR – ideally some kind of diagram that mapped the different initiatives.

The group also welcomed the suggestion, that it might be useful to include in the Action Plan a full review/audit of all UK FGR activities, in order to clarify where this initiative sits and what it contributes to wider FGR activities in the UK.

Session 2 – Interactive Sessions on the Action Plan

An overview of what was being aimed for in the Action plan was presented by Stephen Cavers and a series of existing ideas for activities, drawn from the previous workshop and earlier drafts of the Strategy were shown according to the current 5 areas of work outlined in the Strategy text: Collaboration for Change; Communication; Research; In situ Conservation; Ex situ Conservation.

The workshop then split into 5 groups and considered the potential additional content and gaps for the Action Plan. All 5 groups considered the 5 areas of work in turn, to produce a cumulative list of suggestions for each area. The outcomes of the breakout group discussions are given in Appendix 1.

Next Steps

The attendees agreed the next version of the Strategy will be the final version before publication.

It was suggested that the document needed to make clearer both the long term vision of the Strategy and the short term goals towards this. Agreed there were many vital small steps in the short term to get activities underway and these should be included in the action plan in order to demonstrate early progress. The Strategy should articulate what would constitute success over different timescales.

Agreed that for all elements of the Strategy a full audit/review of existing activities would be a vital first step.

Agreed that a reasonable timeframe for the full Strategy should be 25 years and noted this would fit with the lifetime of Defra’s 25 year plan.

Agreed that it was important to get the Strategy embedded into key documents such as the post 2020 CBD Strategies, and UK government biodiversity strategies that sit under the 25 year plan. It would also be helpful to get the Strategy embedded into government climate change adaptation policies. It would be helpful to demonstrate to government the links with its own responsibilities such as reporting under Biodiversity 2020 and to the CBD, and to the next national report under the Global Plan of Action on FGR (2023 deadline).

Noted it was important to develop a list of species that were covered by the plan.

Discussed whether organisations present considered that they could formally endorse the Strategy for UK FGR. Agreed it was important to define what level of endorsement was required and what this meant. Agreed the Steering Group would draft a short text for individuals to use when seeking endorsement from their organisations. Noted also that the final document should include a list of all individuals who have contributed to drafting the Strategy.

It was suggested that small tweaks could make a big difference to the text. For example, remove the phrase 'we need' and replace with 'the strategy aims to'

The Steering Group agreed to make changes but suggested that it would be helpful if individuals with fresh eyes looked at the text. Fiona McFarlane, Dani Ballesteros and Pete Hollingsworth agreed to do this.

WORKSHOP ATTENDEES

Alice Hudson	RBG Kew
Brian Clifford	Department of Agriculture, Food & the Marine
Bruno Fady	French National Institute for Agricultural Research
Chris Reynolds	Forest Research
Clare Trivedi	RBG Kew
Colin Kelleher	National Botanic Gardens, Glasnevin
Daniel Ballesteros	RBG Kew
Fiona McFarlane	Natural Resources Wales
Gerry Douglas	Agriculture and Food Development Authority
Gustavo Lopez	Forest Research
Jeanette Hall	Scottish Natural Heritage
Jo Clark	Future Trees Trust
Joan Cottrell	Forest Research
John Weir	Forestry Commission
Karen Russell	consultant
Kathy Willis	RBG Kew
Nick Atkinson	Woodland Trust
Pete Hollingsworth	RBG Edinburgh
Richard Buggs	Royal Botanic Gardens, Kew
Rodrigo Olave	Agri-Food & Biosciences Institute
Sarah Roberts	RBG Kew
Stephen Cavers	Centre for Ecology and Hydrology
Steve Lee	Forest Research
Tim Rowland	Future Trees Trust
Yvette Harvey-Brown	Botanic Gardens Conservation International

APPENDIX 1 – OUTCOMES OF BREAKOUT GROUPS

Collaboration for Change

Activities

Establish a Steering Group, with wider membership than the current drafting group. This needs to include representation from policymakers, academia and industry. It needs to link science with policy and include representation of England, Scotland, Wales and N. Ireland. JNCC would be well placed to do this.

Note and clarify the difference between the Steering Group and Stakeholders more widely. Steering Group members need to represent and feed back to their constituents. Stakeholders can be invited to Steering Group to represent specific issues.

Steering Group needs to be integrated with government policy, eg via 25 year plan or UKFS.

Reconsider the name for the Strategy.

Is UKFGR about Noah's Ark or transformative Change i.e. Is the immediate aim to secure the UK's tree genetic identity, i.e. through the establishment of GCU's and *ex situ* work/research? Or it is about changing the way that landowners manage their land so that the objectives around gene conservation are met? It can be both, but on different timescales.

Identify and explain what "the sector" is

Explore options for Agri-environment Scheme Funding – public goods for public money.

Develop an organigram describing where UK FGR fits with other UK strategies such as Action Oak, and with international processes such as FAO Global Plan of Action, FPPH#6 – Resilience, Agri Environment Schemes, Biosecurity, Brexit more widely, including funding for these.

Take advantage of opportunities to raise profile eg APF, ICF Conference, Defra's Green Week, National Tree Week.

Key next steps: Strategy/Committee, Business Plan, Comms Plan, Funding Plan/calendar.

Priorities: Communications, Establish the policy context, establish GCUs, advocates required to drip feed the message and facilitate collaboration.

Funding required for maintaining Steering Group momentum; communications; research; oversight and management of GCU system (eg inspections).

Funding options: Government (increasingly limited); NGOs; Grants eg HLF and Research Councils; Public funds; In Kind contributions eg provision of forestry sites etc

Communications

Focused communications required for policy makers.

More general communications required for other stakeholders; nurseries and seed merchants, NGOs, Government Agencies, Foresters, Landowners and managers

Pull together what resource we're already got in terms of trials and archives and let people know what we have, where it is. This includes consolidating knowledge on patterns of genetic variation as far as we know for key species.

Promote what is a GCU, and what are the advantages. A GCU could also act as a seed source. Explain clearly what is involved in having a GCU on your land, what you should do and how to register. Link to FR doc on how to do this.

Incentivise registration of GCUs/seed stands. Note WIG available for seed stands.

For policy makers find hooks for FGR. Get FGR Strategy endorsed by policy advisor for each country. This will enable woodland officers to approve the WIG for GCU status.

Develop case studies to communicate the value of FGR and how diversity is already used. For example, the genetic diversity found within ash being utilised in light of Chalara.

There is variation in what people perceive as native and naturalised. Dropping use of word native to avoid confusion over sycamore, sweet chestnut, horse chestnut which are not native, but are naturalised (n.b – this was one persons view and not necessarily agreed with in that group).

Education of Woodland Officers

Alignment of policy with Republic of Ireland

Champions to push FGR to stakeholders such as the country policy advisors

Aim for a Communications Strategy

-for policy, why is FGR important and get this into guidance to give substance of change

-what do we want to achieve

-initial change in some sites

-target comms at most suited people, then wider PR campaign to funders for cultural change in understanding and use of FGR.

Research

Communicating and collating research

- Produce an annual 'Research Highlights' communication to keep community informed on research progress
- Use dabases, EUFGIS and GD2
- Repository database for tests (reporting what/where/when), leading to tools for informed provenancing
- Produce Special Issue / Papers reviewing state of knowledge

Finding funding:

- Idea/proposal to Strategic Programme Action Group at NERC, backed by FGR Strategy community
- Seek funding for a NERC Doctoral Training Partnership /Marie Curie International Training Network to funds PhDs in the subject

- 10k genomes call: baseline genomes project call – possible source for sequencing genomes of priority species (link to existing targets / propose selected group of species)
- Form collaborations to tackle specific research areas
- Funding timescales
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Topics

- Gap Analysis of Data/Funding/Resources ***Identified universally as a priority***
- Identify 'Hot spots' and 'cold spots' of diversity
- More work on proxies to refine environmental proxies and develop new ones
- More understanding of post-glacial colonisation processes
- Genetic Monitoring
- Why diversity matters
- Dynamics of Genes in GCUs, especially under impact of disease, Need for breeding
- Tools / systems to deliver indicator data for government commitments – e.g for reporting on State of the World's FGR / Convention on Biological Diversity
- How to meet national CBD obligation on requirements on genetic diversity (Aichi Target 13)
- How to achieve seed supply (of good quality, site matched seed at a scale sufficient to meet demand)
- Assessment of what / how much genetic diversity is not in existing trials
- Historical human selection pressure
- Role of FGR in the context of Climate Change (how to manage and how to make use of)
- Economics – value of FGR, motivating management, grants for seed stands.

Priorities

Gap analysis to identify needs for data / experimental resources / funding, e.g. where has funding already been committed.

A clearing house for data. EUFGIS database already exists for Europe and would be a good best home for distributional data but does not yet support genetic diversity layers (focus for funding?).

Work on proxies for genetic variation, EUFORGEN use of Metzger environmental zones uses resolution at the continental level, so need finer level for UK and to assess how these work for different species. Also need to include other factors (e.g. soils, biotic interactions, topography)

Try to influence the direction of research funding and forge research collaborations

In Situ Conservation

The EUFORGEN approach would only require 2 GCU's per species to capture adaptive genetic diversity at a broad European scale, but should we be more ambitious and aim to capture adaptive diversity in UK FGR at a finer ecological scale, e.g. using FC seed zones and aiming for one per species per seed zone or one per FC Regions of Provenance.

We should aim initially for 2, but might ultimately wish for more GCUs per species.

GcUs can be used as demonstration plots for education of foresters, showcasing good management towards conservation of FGR.

Need to identify priority species. Potential criteria might be

- Threatened species such as those at risk from diseases such as oak, ash and juniper, or those at risk from loss of habitat eg. Montane willows, beech in southern England.
- Special habitats such as Caledonian pinewoods, Atlantic oaks, Atlantic hazel.
- Contrasting set of species e.g. a set with different pollen and seed dispersal strategies.
- Species for which there is some existing genetic diversity information e.g. Scots pine, oak, rowan, ash.

Timeframes aim for 5 species to have 2 GcUs per ecological zone within 2-3 years.

Ex Situ Conservation

Activities should include completion and maintenance of seed bank collections via the UK National Tree Seed Project because this captures a wide range of genetic diversity, but also consider wider ex situ activities, particularly for recalcitrant species. Note also that seed bank collections are static and not undergoing dynamic adaptation.

An audit of all existing ex situ resources is a priority

Forest Research and Future Trees Trust have good records of all their 'long term experiments' such as provenance trials which provide good living ex situ collections. Sometimes when provenance trials come to an end the genetic diversity continues to be conserved by grafting clones or storing in tissue culture. For example, the Conifer Breeding Co-op already plans to have 2 sites holding 5 copies each of 1200 clones of Sitka Spruce. The Conifer Breeding Co-op is funded by commercial companies such as nurseries and forest management companies. This might be done for other species too.

Note stands of Oaks do exist, though they are mostly selected material, they are of known origin.

Living ex situ collections of trees in the landscape are susceptible to threats such as pests and diseases. Might future collections be made more secure with enhanced biosecurity protection?

It is important to make breeders aware of the ex situ genetic resources available to them, via good links to NTIS and inclusion of the value of ex situ collections of FGR in the Communications Strategy.

Note the importance of capturing unique genetic diversity from Northern Ireland

Seed stands might be considered an ex situ resource. There is demand for both improved and unimproved seed. Seed bank collections could provide founder stocks. A priority action is to develop a concept note and budget for such an activity.

Note the opportunities with Northern Forest to develop ex situ stands that might be experimental and or demonstration plots, and might also be seed stands.

It will take time to develop a good method for cryopreservation of Oak seed/embryos but ex situ collections could be quickly developed via cryopreservation of pollen and/or dormant buds. This

work could potentially be carried out by Kew via the MSB cryosphere proposal but would need funding.