Background

The Royal Botanic Garden Edinburgh is a non-departmental public body, in receipt of grant-in-aid funding from RESAS. RBGE’s mission is to ‘explore and explain the world of plants for a better future’. This is delivered via the following strategic objectives:

- Delivering world leading plant science and conservation programmes to reduce the loss of global biodiversity and to achieve a greater understanding of plants, fungi and environmental sustainability.

- Maintaining and developing our internationally important collections in order to maximise their value as a research, education and heritage resource.

- Providing learning and training in horticulture, plant science and biodiversity conservation to stimulate people to appreciate, understand, and to contribute to the conservation of plants and our natural environment.

- Offering a first-class visitor attraction to enable more communities, families and individuals to enjoy and be inspired by our gardens and their facilities, become more environmentally responsible and to support the work of the Royal Botanic Garden Edinburgh.

RBGE is a member of the Scottish Environment, Food and Agriculture Research Institutes (SEFARI) collective of six Scottish research institutes each with their own global capability, expertise and reputation. RBGE contributes to the Strategic Research Programme (SRP) and is also a user of the SRP research outputs. RBGE does not, however, receive any direct funding via the SRP.

Strategic Research Programme

1. How is your organisation engaged in the development of the strategic research programme?

- RBGE does not receive additional funding through the Strategic Research Programme, but it does align its Scottish biodiversity science programme to delivering goals that support the Strategic Research Programme. These goals are developed at the tendering-stage through discussion with Strategic Research Programme Theme and Work Package leaders.

- During delivery of the Programme, RBGE has representation at Theme 1 meetings (Natural Assets), and at the Work Package 1.3 and 1.4 Steering Group Meetings (held jointly with Scottish Government), and contributes to
Strategic Research Programme research topic and policy-interface meetings (recent examples include a Connectivity Scoping Workshop, and the Ecosystems and Land Use Stakeholders Engagement Group).

- RBGE work in the Strategic Research Programme is delivered in collaboration with other SEFARI institutes. These collaborations are a source of added-value in terms of multidisciplinary research based on the complementarity in research strengths among institutes.

2. Is the approach to funding effective in supporting sustained research in priority areas?

- RBGE views the funding provided to the other SEFARI organisations via the SRP as very effective in research delivery. Of particular importance is the long-term nature of the funding enabling the development of international quality science, co-constructed with government and stakeholders, and a highly collaborative environment for research in Scotland, which itself represents a basis for leveraging research funding from other sources.

3. How does your engagement contribute to the delivery of the National Outcomes and the Scottish Government’s Purpose?

- RBGE’s total contribution to delivery for Scotland encompasses:
  
  o Safeguarding Scotland’s National Collections: Protecting one of the world’s most significant living and preserved plant collections - the cornerstone of RBGE’s innovative and highly ranked science.
  
  o Promoting Scotland’s place in the World: Running global programmes and partnerships associated with research and education, and promoting “global citizenship”.
  
  o Delivering for Biodiversity Conservation: Enhancing Scotland’s reputation as a leading nation in the conservation of biodiversity
  
  o Enhancing Social Inclusion: increasing opportunities for civil participation through volunteering in horticulture and education, urban greenspace improvements, extensive community engagement programmes (with emphasis on those with support needs), providing internship opportunities, and helping adult learners get back to education or to enhance their existing jobs.
  
  o Enabling Unique Learning Programmes: Providing life-long learning opportunities including curriculum focussed schools programmes, daytime and evening classes, and professional apprenticeships, diploma and undergraduate courses.
  
  o Producing World Leading Plant Scientists and Conservationists: Providing a centre of excellence for training and inspiring botanists and conservationists for Scotland and the world.
  
  o Contributing to Economic Growth: Increasing income through tourism, leveraging external research grants, public engagement funding and education fees. There are over 900,000 visits to RBGE each year. The total economic impact of RBGE’s operation is estimated at £23 million per annum.
More specifically:

- In terms of links to the SRP, RBGE’s work is strongly focussed in supporting practical outcomes in delivering Scotland’s Biodiversity Strategy (e.g. research to ensure effective Route Map targets/actions) and the Scottish Plant Health Strategy. This work is focussed in three areas: The Cairngorms National Park, along the Atlantic west coast (temperate rainforest) and in Edinburgh’s urban environment. Our research in the Cairngorms National Park and for west coast National Natural Reserves contributes to Wildlife Conservation and Ecosystem Restoration by supporting and delivering successful management plans and where necessary the translocation of threatened fungal and plant species. This is essential to ensure resilient populations and habitats. Work in Edinburgh and other population centres has focussed on leveraging Natural Capital investment for species conservation through city greening, and aims to enhance access to and education within biodiverse and restorative environments, strengthening individual and social values derived from nature.

- Outwith the SRP, RBGE’s remit includes a programme of international biodiversity science, being an education hub, tourist attraction, and public and community engagement venue. These collectively have a major role in promoting Scotland on the international stage – via visits to our four gardens, international education and capacity building programmes, and plant diplomacy based on centuries of international collaboration and cooperation with communities and governments around the world. Our international biodiversity science programme is based on innovative research, with leadership and coordination of global networks resulting in high impact science and influence. Our remit brings economic benefits as a leading tourism venue, promotes social inclusion via our community engagement activities, provides skills and training at all levels and ages, and communicates the importance of environmental sustainability and environmental protection to the wider public. Collectively these activities contribute directly to the following National Outcomes:

  o We realise our full economic potential with more and better employment opportunities for our people.
  o We are better educated, more skilled and more successful, renowned for our research and innovation.
  o Our young people are successful learners, confident individuals, effective contributors and responsible citizens.
  o We have strong, resilient and supportive communities where people take responsibility for their own actions and how they affect others.
  o We value and enjoy our built and natural environment and protect it and enhance it for future generations.
  o We reduce the local and global environmental impact of our consumption and production.
- At an international level, our work is aligned to the Aichi 2020 Biodiversity Targets, the Global Strategy for Plant Conservation, and the Sustainable Development Goals.

- The reach and quality of the outcomes of RBGE are summarised in the findings of a recent international peer-review visiting group:

  http://www.gov.scot/Publications/2016/02/3301

4. What is the anticipated impact of the UK exit from the EU on the capacity of your organisation to deliver the Programme?

- RBGE's contribution to the Strategic Research Programme is built on wider activities within the organisation. RBGE has benefitted greatly from external-funding received from the European Union, particularly programmes that maintain underpinning capacity in Taxonomy and enable effective conservation of, and access to, our National Collections. Loss of access to this funding stream/European network would have significant impacts. Ultimately these impacts will depend on the nature of the new funding landscape.

- Our staff are drawn from a wide international pool with some cutting edge programmes led by EU nationals. The uncertainty regarding their eligibility to work is an immediate concern. We would be heavily impacted by any restriction in the mobility of European scientists, and we want to maintain unrestricted access to the international marketplace of first class students/academics. This is to support our staff well-being and job-security and to promote institutional scientific excellence.

Centres of Expertise

5. Is your organisation involved in a centre of expertise? If so can you set out this involvement and the timeframe and funding attached?

- RBGE was a founder member of ClimateXChange, co-leading the Adaptation Programme of work from 2011 to present, and delivering Scotland’s National Adaptation Indicators to the Adaptation Sub-committee of the UK’s Climate Change Committee.

- During the period from 2011-2017 we were funded directly by the Scottish Government. Owing to a reconfiguration of funding, we are now subcontracted to deliver adaptation project work on an annual basis by ClimateXChange.

6. For those involved in a centre of expertise what are the benefits and challenges associated with this approach?

- Overall we see a great benefit in the Centres of Expertise. They facilitate the route from research to impact. In our experience there has been a necessary development phase honing ‘ways of working’ and growing the culture of the
smooth flow and translation of knowledge from evidence-providers to evidence-user.

- From our own perspective, concerning ClimateXChange, a recent shift from multi-year direct institutional funding to annual tendered-work with a very tight timescale between commissioning and commencement creates a vulnerability. This increases stress on staff members and the difficulty of maintaining capacity and expertise.

7. Are there any particularly pressing gaps in the issues that are currently covered by centres of expertise?

- The planned Centre of Expertise in Plant Health is viewed by RBGE as being of great strategic importance. Threats to plant health in Scotland continue to rise, and represent substantial challenge to multiple sectors (including Horticulture, Forestry, Agriculture, Natural Environment). There is currently a clear gap in mobilising and synthesising the evidence base to provide support and responses to this multi-sectoral, complex and rising challenge.

Innovation Funding

8. Does your organisation receive innovation funding? If so how has this supported collaborative working and what have the outcomes been?

- RBGE receives c £1 million per year external research grant funding (e.g. NERC, EU, BBSRC, Leverhulme). It does not receive funding directly via dedicated innovation funding streams.

Underpinning Capacity

9. What activities are supported by funding to underpin capacity? What costs are attached to this and what are the expected outcomes?

On the assumption that this question does not relate directly to the SRP:

- RBGE’s grant-in-aid (and external grant income) supports the maintenance and development of our National Collection, comprising the world class herbarium (3 million specimens, dating back to 1697), an internationally important botanical library and archive, and a living plant collection of 13.5K species from 157 countries.

- RBGE also maintains and develops Taxonomic Expertise as underpinning capacity (there is a global shortage of expertise in species discovery, description and identification, which in turn underpins conservation and sustainable use of biodiversity).

- Overall our underpinning capacity and maintenance of our collections costs ca. £2.6 million per year [including all overheads/indirect costs].
There is a flow from our underpinning capacity, via analytical research, to outcomes in knowledge generation and the conservation and sustainable use of plants. These outcomes include provision of a national and international biodiversity resource, addressing basic questions such as which species grow where, and provision of new open-access tools (e.g., DNA barcoding) for biodiversity discovery and threat assessment. The underpinning capacity at RBGE directly supports conservation and sustainability projects in 35 countries around the world, with a much wider pool of countries accessing data drawn from this capacity each year.

10. How secure is this funding stream?

- RBGE’s grant-in-aid funding comes directly from RESAS (£8.494 million 16/17) and is supported by self-generated income of £4.717 million (16/17). RBGE’s underpinning capacity remit is defined by the 1985 Natural Heritage (Scotland) Act, and this creates an internal prioritisation of budgets to meet the remit defined by the Act. RBGE has recently developed a new fundraising strategy aimed at increasing financial resilience and addressing budgetary shortfalls. Ultimately the security of the funding stream will be determined by levels of Grant-in-Aid support from RESAS and our success in generating additional income.

11. How do you work with SEFARI?

- As an MRP (Main Research Provider) that supports the Strategic Research Programme we are a member of the SEFARI collective of the six Scottish research institutes. This working relationship is close and effective.

- We provide some office space for the SEFARI Gateway team at RBGE, we have led a SEFARI Responsive Opportunity fund on the conservation of genetic diversity (in support of Aichi Target 13), and we have collaborated with SEFARI by deploying our science communication staff and infrastructure at the John Hope Gateway to communicate and amplify key messages emerging from the Strategic Research Programme. RBGE views the SEFARI Gateway initiative as extremely important as a mechanism for research synthesis/communication/exchange of research outcomes.

12. What additional benefit does it bring to your organisation and does it bring any challenges, if so what?

- SEFARI has helped to strengthen existing research and make new connections between contrasting research themes, and it has enhanced dialogue and greater permeability across diverse research areas. The collaborative networks formed via SEFARI are currently being used for further large scale funding proposals.

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**Contract Funding**
13. The funds available through the contract research budget have declined significantly. How has this impacted your organisation?

- RBGE has not historically received significant funding via the Contract Research Fund.

**Additional issues**

14. What do you consider to be the key challenges for your organisation, the research community and research funding in Scotland over the next 10 years?

- Maintaining underpinning capacity for collections, long-term datasets. This is challenged by funding pressures, especially coupled with competing needs for flexible responses to emerging policy issues. Long-term datasets are of critical importance in understanding threats and developing solutions for many large scale challenges (e.g. food security, biodiversity conservation, ecosystem service provision, understanding and responding to climate change).

- Maintaining a critical mass of world-class researchers and research funding in a financially challenging environment, including the provision of taxonomic expertise. Taxonomic expertise allows critical species to be recognised (e.g. plant pathogens) and ensures that the distributed expertise in species identification among enthusiasts, which underpins powerful datasets such as the NBN Atlas Scotland, can be refreshed and kept up-to-date, so that citizen science data remain valid within conservation toolkits.

- Maintaining a balance between underpinning capacity, excellent science and rapid response to emerging societal challenges.

15. Specifically what is the estimated impact of withdrawal from Europe on your organisation, the research community and funding available to rural, food and environment research in Scotland?

- European research funding has provided support for a range of topics in biodiversity/environmental science and also encouraged mobility of researchers. From RBGE’s perspective, these two strands of work – mobility, and building biodiversity capacity/understanding are of great importance at a time of large scale environmental change and increasing environmental pressures.

- It is difficult to assess the precise consequences without clarity on the new funding landscape. A complete funding withdrawal without compensatory replacement would have substantive and critical consequences for rural, food and environment research – reducing competitiveness and the benefits from participation in international research networks. International networks will only become more important given the international nature of many emerging societal challenges (food security, climate change, biodiversity conservation, plant health etc).
16. What steps do the Scottish Government and research organisations need to take to address those challenges?

- Government: clear articulation of need, continued investment to maintain core capacity to meet need.
- Research organisations: flexibility, awareness of policy needs, co-construction and delivery of timely targeted products, clear communications about importance, value and relevance of longer term research programmes.

The Committee is also aware that RBGE receives £11.277 m from the Scottish budget:

- This is incorrect; for 2017/18 RBGE Grant in Aid is £8,494m, plus £1m capital funding.

17. What proportion of RBGE income comes from the Scottish Government?

- 64% of RBGE income came from the Scottish Government - 16/17 outturn.

18. What proportion of the Scottish Government RBGE funding is spent on research?

- 25% of RBGE’s total budget is spent on research (of which 20% is spent on research focused in Scotland), and 20% on the national collections which provide underpinning capacity. The remaining spend is on maintaining the RBGE infra-structure, running the four RBGE gardens as a tourist attraction for c 1 million visitors per year (43% of budget), and delivering the RBGE education, community engagement and outreach programmes (12% of budget).
19. Do you anticipate that the Scottish Government funding for the RBGE will increase or decrease in the coming years

- We do not yet know the level of 2018/19 Grant in Aid, although in recent years funding from the Scottish Government has in real terms reduced year on year. We are aware of the pressure on public finances and will continue to work with colleagues in the Scottish Government on future budget scenarios. As for capital funding, we have submitted a Business Case for the urgent restoration and replacement of mission critical buildings in the Edinburgh and are working with the Scottish Government to secure funding for the project (£42m over 10 years) – more details below.

20. What are the budget challenges for the RBGE associated with buildings and facilities

There is an urgent need to restore and replace the mission-critical buildings and facilities:

- Grade A listed Heritage Glasshouses which are in very poor condition and will need to be closed for health and safety reasons in approximately 7 years if they are not restored and repaired. They contain an irreplaceable plant collection of 2,495 species built up over 200 years, and are a major tourist attraction.

- Decrepit and deteriorating Research Glasshouses and associated infrastructure that are well beyond their designed life and are susceptible to catastrophic loss – placing the Research Collection of 3,203 species at risk (including many classified as threatened, extinct in the wild, or are new to science).

- An Education centre that is not fit for purpose, does not meet demand and is part of dated, scattered and sub-optimal education facilities at RBGE. Failure to create a new education hub will lead to decline in RBGE’s unique international and national education programmes.

In addition there is an extensive backlog of maintenance across the RBGE estate, estimated at a total cost of £15m; with attendant and significant operational penalties and risk to: the National Collection, and RBGE as a major Scottish visitor attraction, a world leading botanic institute, and a unique centre for education and public engagement. This figure is likely to increase without additional investment.