Botanic Garden Creation and Management: the feasibility and design of new British collections

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PhD Thesis

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9 Alternative Solutions

The previous chapter describes the decision making process followed in an attempt to establish a Somerset Plant Collection (SPC) at Carymoor Environmental Trust (CET). The constraints resulting from the existing site and management procedures made finding a financially sustainable solution difficult. Part of the reason for this was that the staff had a desire to have a plant collection because it was felt that it be useful. Another way of approaching the challenge of creating a new botanical collection would be to question what roles it is desired to perform and then try and find a financially sustainable solution. The constraints encountered with the SPC, as with other botanical collections, were unique to that organisation at that time.

Despite the individuality of each botanical collection it is proposed that some general insights can be made into decision-making process surrounding the establishment of a new botanical collection. As a result, this chapter will take a wider view and address the feasibility of establishing a multi-role collection of British plants in Britain as well as alternative ways of achieving the individual roles. It will be assumed that at the start the prospective botanic garden has no collection, no financial backing and no property, it is also not affiliated with any other organisation.

9.1 Multi-role Approach

If the prospective founders of a hypothetical organisation had a desire to create a collection that is based on the traditional style of botanic garden (group ABG), that is one that is involved in conservation, research, education and recreation, they must consider how to fund their venture. Capital funding for the purchase of the land and creating the physical structure of the garden could be raised in a number of ways including Lottery funds, private or commercial donations and local or national regeneration funds. The success of this attempt, to a large extent, would be based on the ability of the founders to generate interest and excitement about the project. However, as has been demonstrated by the experience of the National Botanic Garden of Wales, once the capital funding has been raised and spent there is an ongoing demand to generate money to cover the running costs.

As an independent organisation, without the financial backing of the government or a parent company, the founders of this botanic garden would have recognised the need to generate income and would have assessed the revenue generating potential of the main roles of a traditional botanic garden. Formal education programmes have repeatedly been shown to be unable to generate a profit in botanic gardens, although when managed well they can cover their own costs. Most research facilities rely on outside research grants. This is not a reliable enough source of income on which to found a garden and does not supply enough additional money to support non-research aspects of a collection. Conservation is similar to research in that external funding is only really available through grants. If there is any funding available at all for conservation it, like research, is distributed through grants. As with research, this is not a feasible method of supporting a whole collection. The existence of the numerous commercially viable gardens operating in Britain show that it is feasible to support a plant collection through the willingness of people to pay to visit a garden for recreational purposes. From this analysis it can be seen that the only feasible option is to create a botanic garden that is primarily geared towards generating revenue from visitors.

Identifying visitors as the main source of revenue has implications for the characteristics of the resulting garden. Before any of the other potential roles of the collection can be considered there is a necessity to create a garden that is attractive to visitors, has an infrastructure of facilities to support them such as toilets, cafes, parking and is conveniently linked to transport routes. This core structure

lends itself most readily to the role of education, primarily through edutainment but also through a formal education programme, as this can be added without requiring constant financial support from the visitor revenue.

Depending on the characteristics of the land chosen on which to site the garden, a conservation role may be fulfilled through the *in-situ* management of an existing habitat, or new habitats could be created. These could add to the appeal of the garden to the visitor and therefore could be considered part of the core structure of such a garden. However, if the role of conservation were to be achieved through other activities, such as plant reintroduction programmes, these would have to be financially supported through either visitor revenue or external grants. The same is true of research. The result of this process is an organisation with a structure that can be represented by Figure 9.1 below where formal education, research and conservation are secondary activities to visitor revenue generation and edutainment.

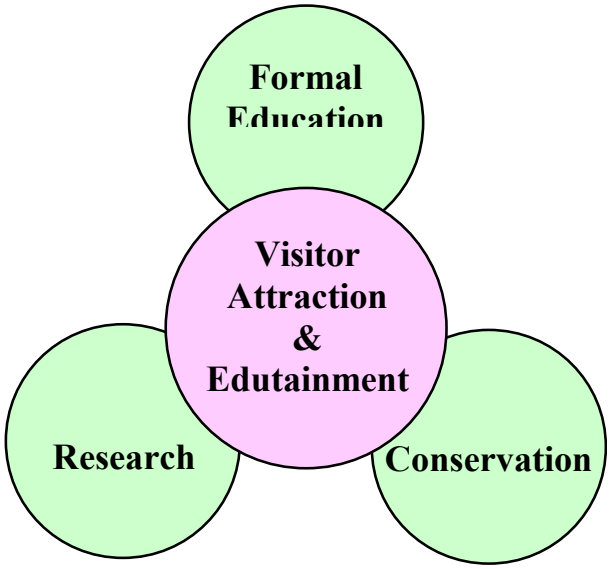

Figure 9.1 - Visual representation of the relationship between proposed roles of a botanical collection

Once this basic structure for the garden has been decided consideration can be given to the details of the other elements such as the type of display and type of interpretation to be utilised.

9.1.1 Type of Display

The primary role of the collection would be to provide a display of British plants that was attractive enough throughout the year to generate sufficient visitors to raise revenue and where the plants are displayed in such a way so as to communicate stories about those plants. The majority of plants needed to fulfil these roles would probably be of little scientific or conservation value. Collections for non-core activities such as research and conservation would be assembled as needed and when the project finishes they are either included into the collect, providing they can contribute to the primary role, or dispersed by other means. This division between plant roles and the active assessment of the collection should help prevent a build up of collections for collectings sake.

The arrangement of the plants in the garden would need to be considered, as there are several options. The results of the market research showed a preference from all three groups questioned for plants to be displayed in habitats (section 7.9.1 page 312). The academic institutions then desired to see displays dealing with issues such as adaptation, evolution and genetics, while the small survey of potential public visitors

suggested an interest in the ethnobotanical history of plants and how they can be used in gardens. However, the importance of these criteria is questionable as the Eden Project illustrates. It does not display any part of its collection taxonomically but still manages to provide education programmes that address issues such as adaptation.

The biggest problem with displaying a collection comprised entirely of British natives will be continuing interest through the winter months. This can be tackled in two ways; firstly, by providing covered facilities (see section 9.1.4 below) or, secondly, by running events. For example, walks could be organised to appreciate the autumn colours or the illuminated garden, or events organised to celebrate Halloween, bonfire night, and Valentine's Day, all of which fall within what would be a quiet time for such a garden. This time of year could also be used to host sculptural exhibits outside.

Despite its size, Britain has a very varied geology and climate. Changes in bedrock mean that soil pH can vary from acid to alkaline. The annual rainfall over the country varies from under 76cm (30inches) in the east to over 152cm (60inches) in the Highlands (Perring & Walters 1990) and due to Britain's latitude the average daily amount of sunlight received varies from less that 4-hours in the north to more than 5-hours in the south (Punnett 1989). In order to grow all of British species a variety of different conditions would need to be provided. Even then difficulties may be encountered when growing plants from the extremes of the range, such as Hottentot-fig (*Carpobrotus edulis*) and Sally-my-handsome (*Carpobrotus acinaciformis*) from the cliffs of the southwest and the Isles of Scilly (originally from South Africa) or the Scottish primrose (*Primula scotica*) from North Scotland and the Orkneys (which at RBG Kew is grown in a refrigerated bed). With herbaceous plants and small shrubs it is easier to manipulate the conditions they require as in the extreme of cases they can be grown in pots in suitable media and kept in climate controlled conditions. However, if it is desired that trees from a variety of conditions be grown then the arboretum must be sited at a location that has a natural variation in soils and microclimate. This is the reason that Oxford University decided to retain the estate at Nuneham Courtenay as an arboretum (see section 3.3.1).

If the plants were to be displayed in habitat groups a decision would be needed to establish how the habitats were to be classified and which were to be used. There are a variety of ways of defining and classifying habitats. For example, English Nature use a system called 'Natural Areas', which consists of 120 different groups. While, Rodwell's '*British Communities*' is comprised of five volumes, each dealing with a separate set of habitats (Rodwell 1991a, 1991b, 1993, 1995 & 2000). These are then subdivided into twelve subgroups, each of which contains a set of habitats. In total there are 286 distinct habitats identified.

Woodland and Scrub (25)
Mires and Heaths
- Mires (38)
- Heaths (22)

Grasslands and Montane Communities
- Mesotrophic Grassland (13)
- Calcicolous Grassland (14)
- Calcifugous Grassland & Montane Communities (21)

Aquatic Communities, Swamps and Tall-herb Fens
- Aquatic Communities (24)
- Swamps and Tall-herb Fens (28)

Maritime Communities and Vegetation of Open Habitats
- Salt-marsh Communities (28)
- Shingle, Strandline and Sand-dune Communities (19)
- Maritime Cliff Communities (12)
- Vegetation of Open Habitats (42)

286 separate plant communities is a lot to recreate and manage (Eden, for example, is divided into only 68 different areas (Petty 2002)), especially when many look superficially the same and are floristically similar. However, recreating only one habitat for each of the twelve subdivisions would leave some common habitats under-represented. Which habitats are chosen to be recreated, and in what detail, will inevitably rely on what habitats already exist and what could be successfully grown. In addition to this the different times it takes for different habitats to mature should be considered. For instance, a created meadow will quickly mature to a stage where it is recognisable as a representative of a meadow that has been managed for many years but a newly planted woodland takes many years before it can be viewed as a representative of that habitat type. Therefore, if the display of woodland is an important part of the story that the botanic garden is to tell, a location should be found that already has mature woodland on it.

9.1.2 Type of Interpretation

The discussion of interpretation techniques (section 5.1 page 190) illustrates the number of media available with which to interpret a botanical collection. It also shows that the best medium, or suite of media, to use will depend on the particular circumstances for which it is being devised. However from research done in this area the following generalisations can be made. Rose *et al.* (2001) have shown that a Socratic method of teaching is more effective than didactic methods. Therefore the interpretation of the new botanical garden should attempt to engage the visitor in a dialogue, rather than lecturing at them. The use of a variety of media that use different senses to describe the same topic will cater for the differing ways people imbibe information about their surroundings. In addition to this the use of a tiered approach to interpretation, such as the 3-30-3 message pyramid described in section 5.1.4.1, will allow visitors to access the information at a level that is suitable for them. For the organisation's messages to be clearly understood by the visitor the organisation itself must first have a clear understanding of them. This will allow a cohesive interpretation strategy for the site to be constructed. Whichever method of interpretation is chosen, it is important that each element is assessed to ensure that the message it is meant to be conveying is being understood by the visitor.

9.1.3 Location

The investigation into the location of existing British botanic gardens (section 4.7 page 177) showed that the macro-positioning of the garden seems to have little bearing on the number of visitors. However, the significance of accessibility to the garden on a smaller scale has not been established and may well have a significant affect. This should either be studied further before siting a new garden or care should be taken to ensure that the garden is well connected to roads and is easily accessible by public transport. The availability of funding, for example from grants designed to encourage development in certain areas, may well influence the final location of a new garden.

9.1.4 Facilities

It has been shown in section 4.1.1.1 that a significant proportion of botanic garden income can come from non-admission visitor spending. To provide this opportunity a new botanic garden should have facilities, such as a shop and café, where additional revenue can be generated. This might also include areas that can be hired for functions such as conferences or wedding receptions. If these buildings and the garden are designed at the same time with this purpose in mind adaptations such as separate parking and entrances to the buildings and garden for conference attendees etc. may increase the ease with which they can be used. The inclusion of an amphitheatre or lawn large enough to hold a stage and audience would further enhance the possible revenue streams for the garden.

The uncertain, and often unpleasant, weather in Britain means that the provision of covered and heated areas where visitors to the garden can seek refuge will increase the attractiveness of the garden as the destination for a trip. Suitable indoor space could also allow other attractions to be incorporated that would extend the visitor season, for instance a science centre or gallery.

The provision of dedicated spaces for school and other course attendees would give these groups an area where bags can be left and they can meet for lunch. This reduces the presence of these groups *en mass* in the garden thus also reduces their impact on the other visitors' enjoyment of the garden.

9.1.5 Feasibility

Judging the feasibility of a potential botanic garden requires comparing the cost of running the garden against a forecast of the number of visitors that will attend and the amount they will spend. Estimating the running costs is the simpler of these two tasks. Using data, such as that resulting from the survey of botanical collections (chapter 2), a figure can be derived that represents the cost for a certain size and style of garden. For example Table 2.19 (page 52) shows the results of calculations to estimate the average amount of land used per species held by the differing classes of botanical collection. These figures do not just represent the space required to grow the average species but also includes its fraction of the car park, visitor centre, nursery etc. that botanical collections are comprised. These resultant figures indicated that on average British arboreta contain 24.8 species per hectare (Table 2.21). According to Davison (2001), there are more than 1,500 species of tree growing in Britain. Of these, 32 broadleaf and 3 conifer species are considered native. Given these figures it can be deduced that to grow a representative of every tree, in the manner used by these arboreta, would require at least 60.5-hectares (150-acres), coincidentally this is similar to the median size and number of species for British arboreta. If only the native species were to be displayed an area of at least 1.4-hectares (3.5-acres) would be needed.

Kent (1992) gives the total number of native plant species in Britain as being 2,297. The average number of species per hectare varies between the different groups of botanical collections. However, if for this example group ABG gardens are used the median density is 131.4 species per hectare (see Table 2.21). When this is applied to Kent's native species number it can be estimated that a botanic garden of at least 17.5-hectares (43.4-acres) would be required.

The results of the survey of botanical collections also allowed the average annual costs per hectare to be calculated (see Table 2.35). With these and the areas derived above it is possible to achieve a rough estimation of the annual cost of running a collection containing all British species. Arboreta typically cost £1,747 per hectare to run, therefore a 60.5-hectare arboretum would require an annual budget of £106,000. While if a 17.5-hectare site were to be run in the same fashion as a group ABG garden its cost would be approximately £1million *per annum*.

Forecasting visitor numbers is a far more difficult procedure. In a House of Commons report (House of Commons Committee of Public Accounts 2001) discussing the financial problems of the Royal Armouries in Leeds, the Department for Culture, Media and Sport stated "…that there were lottery-funded projects, such as the new art gallery in Walsall, the Lowry at Salford, and the Tate Modern in London, where visitor numbers had outstripped what the Department and Lottery distributing bodies had predicted, as well as some which had fallen short". In addition to these examples can be found from botanical collection projects. For instance, the National Botanic Garden of Wales is suffering from an initial over estimation in its visitor numbers. Conversely, an underestimation of the number of visitors to the Eden Project forced them to completely refit the visitor entrance at the end of the first year, an action that added to the existing financial pressures on a new venture.

Hall (1999) describes the three most common methods of visitor forecasting and highlights their faults.

'Fair Share'
This method takes the total number of visits to similar attractions in the area and forecasts potential visits as a fraction of these. This approach fails to recognise that these attractions will have different powers of attraction and therefore visitors are not divided equally between them.

'Infinite Visits'
This method uses visitor numbers from attractions of similar size and type that charge a similar entrance fee. The potential visitor forecast is then based on these figures. This approach assumes that there are an infinite number of visits available, when in reality attractions are competing for limited number.

'Blotting Paper'
This method applies where an attraction is set up alongside another facility such as a shopping centre. In this case the thinking may be that the shopping centre is receiving a certain number of visitors and by being adjacent to it an attraction will receive a percentage of this. This approach fails to appreciate that the shopping centre may well have a different target audience so the potential for attracting passing trade is reduced. It also does not recognise that people have constraints on their time and are less likely to spend time at an attraction unless the visit has been pre-planned.

Hall (1999) recommends the use of market surveys combined with focus groups as a basis for visitor forecasting but highlights the need for skilled interpretation of the results to avoid over estimations.

9.1.6 Marketing

As has been demonstrated throughout this work, botanical collections are all unique. However one unifying characteristic is that they must all be able to convince someone or some organisation to part with money to fund them. In the case of a botanic garden supported by visitor revenue, it is paramount that it is marketed well. Only with good marketing can a new botanic garden expect the required number of people to visit and spend money.

9.2 Individual Role Approach

The description given above is the likely outcome of a thought process that starts with a general desire to create a botanic garden. However, if the perceived need for a botanic garden comes from a desire to implement one of the roles that is traditionally supplied by a botanic garden, it would be worth considering whether this role may be achievable without creating an entire botanic garden. The remainder of this chapter will discuss ways that the four main roles can be achieved without the cost of building and running a botanic garden.

9.2.1 Research

The types of research most readily associated with botanic gardens involve the use of herbaria and laboratories and, as has been shown by the responses to the botanical collections survey (Chapter 2), use only a small percentage of the living collections (7.5%). It might be possible to set up a scientific research centre without a botanic garden, although as has been explained earlier in this chapter without the financial support of an organisation such as a university this organisation would

be primarily dependant on grant funding. One area highlighted by the interviews conducted for case studies in this thesis as requiring further research is the efficiency of botanic gardens at delivering their educational messages. This type of research does not require large research facilities fitted with expensive laboratory equipment. Instead the research could be conducted in existing botanic gardens. Without the financial support of a parent organisation the research group would need to generate its own income. This could possibly be done through a consultancy service providing assessment, training and design of exhibits for botanic gardens.

9.2.2 Education

The content of a formal botanic garden education programme could be taught in a classroom without the use of a botanic garden. Indeed many are based on the national curriculum, which does not require schools to take students on visits to a botanic garden. However, as has been shown in the education theory section (section 5.1.2), classroom teaching is not necessarily the most effective way of educating students when compared with hands-on activities and field trips (Wendling 1989). Therefore a trip to a botanic garden with an education programme can provide an advantage in teaching related subjects. Earth Education (EE) demonstrates that specific collections are not necessarily needed. Instead it emphasises the importance of good programme design, suggesting that for the best results an environmental education activity should consist of three parts (hooker, organiser and immerser). Using this EE framework an effective environmental education programme can be created using the existing landscape. This removes the need to maintain a botanic garden and has the added advantage that, by using the familiar surroundings of the recipient, it should allow them to relate the principle being taught to the surroundings on a more personal level. An organisation wishing to promote environmental education on this basis could have two approaches. The first would be to train and supply educators. As staff salaries make up a large proportion of any organisations budget this could prove costly. The second approach, requiring fewer personnel, would be to promote this style of teaching amongst existing educators and provide them with training.

9.2.3 Conservation

The belief that botanic gardens can provide a useful and legitimate addition to conservation by holding long-term collections of species in low numbers has been shown to be misguided (Maunder 1991). In Britain, an existing botanical collection can benefit conservation in several ways-

- through data held in its archives and non-living collections
- through its ability to conduct research
- by educating the pubic on the need for conservation
- through its ability to propagate and grow material
- through the *in-situ* management of existing habitats within their garden

Of these a new organisation would not have the benefit of extensive archives and other collections on which to base a service. The establishment of organisations based on the research and educational roles of botanic gardens has been discussed above and provision of research for conservation or education with a conservation message could be achieved through these. The ability to propagate and grow material is a trait shared with the nursery trade, which may provide a model for an organisation that is funded through the sale of plant material but which also grows and propagates specific material on short rotation for conservation purposes. Alternatively the organisation could go down a similar route to that of the Wildlife Trusts by managing existing habitats for conservation.

9.2.4 Recreation

The review of the previous three botanic garden roles has shown that they are not necessarily dependant on having a botanical collection in a familiar botanic garden setting. However by its very nature the provision of the type of recreation associated with botanic gardens does require green-space. An organisation with the aim of increasing the amount of green-space recreation that occurs has two options. Firstly, they could increase the amount of green-space available for recreation or, secondly, they could increase the use of existing green-space. If the second of these were deemed feasible no additional land would be required. However, if the first route were to be taken there are two approaches, either that of a park or that of a garden. In general, parks in Britain are managed by local councils and do not charge admission, unlike gardens for which paying an admission charge is accepted. Therefore, without the support of funding from another source a garden rather than park would need to be created. Without the additional overheads associated with running a botanic garden finding a financially sustainable solution for the creation of a garden should be easier.

9.3 Summary

The above discussion highlights that the need to find a financially sustainable business plan for a prospective botanical collection has a large influence on its final characteristics. Inevitably an organisation establishing a botanical collection without the financial backing of a parent company will have to become a visitor orientated attraction to generate sufficient revenue.

Despite the individuality of the specific aims and circumstances of each collection there are some general principles of design and management that apply to all. These include the application of interpretation methodology based on education theory to maximise its effectiveness. The inclusion in the design of the garden features that increase its commercial viability. Without good marketing insufficient visitors will be attracted. Finally, constant assessment to ensure the collection is fulfilling its aims.

Without the financial support of a parent organisation the options available to someone wishing to create a new botanical collection with multiple roles would appear to be limited to the creation of a visitor attraction that fulfils the roles of recreation and education. Revenue from this can then be used to support secondary activities such as conservation and research. However, it has been shown that there are a greater number of options available for establishing an organisation that wishes to only concentrate on one of the four roles and is willing to achieve this without the use of a large plant collection. Whichever approach is taken, careful assessment of the feasibility of any proposed venture will be needed to ensure that there is a demand for the service and that enough revenue can be generated to cover the running costs.