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THE BACKGROUND FOR CONSERVATION EDUCATION IN BOTANIC GARDENS

Abstract

As botanical institutions are increasingly at risk throughout the world, either through closure or merger into larger biological centres or departments, it is often the case in many regions that botanic gardens are the only centres that are devoted to botanical activity. This places on them an additional responsibilty to act as information centres for plant science in general and to state the case for environmental concern and conservation. They are well suited, because of their facilities, to play such an advocacy role and this paper will outline ways of addressing these challenges. This should involve all the staff of the garden and will require in many cases a rethink of staffing policy. The ways in which different botanic gardens will react to these problems will depend on many factors such as their location, size, mission statement, acessibility, type of collections and facilities and numbers of visitors. Attention is drawn to the need for conservation educators to ensure that the information they impart is as accurate, balanced and up to date as possible.

Introduction

Radical changes in the organization of plant science and its institutions during this century and more especially in the past few decades, have led to new opportunities and challenges for botanic gardens. No longer is botany seen as a mainstream subject in biological science and the number of University departments of botany has greatly diminished as emphasis has shifted away from separate plant and animal departments and courses towards unification of biology, especially at the biochemical, cellular or molecular level. Departments of Life Science or Schools of Biology abound while Botany or Zoology Departments are beleaguered. The Botanical Society of America polled its membership recently in response to pressure for a change of name that would reflect a more modern image.

An associated trend has been to reduce the amount of time and effort devoted to the study of organismic biology faced with the pressures of an ever-expanding set of subjects and techniques to be covered in the curriculum. In particular taxonomy and systematics have been squeezed out by subjects seen as more exciting or at the leading edge

of biology such as molecular biology and genetics, cell biology, immunology, ethology, biotechnology and other areas highly dependent on precise experimentation and often expensive instrumentation and techniques.

This has placed botanic gardens in an unaccustomed situation: often they are the only institutions in a country that have a concern for whole plant biology, including such areas as taxonomy, anatomy, morphology, anatomy, pollen studies, plant physiology and classical genetics. And by definitions, botanic gardens contain samples of a range of living plants, usually with some associated facilities for their study such as a library, laboratories, etc. In many developing countries botanic gardens are, moreover, likely to be the only institutions in a region with any concern for plant science at all.

For European botanic gardens this is in a sense a return to their past position. The early physic or medicinal gardens were established when botany, medicine, herbalism and pharmacy were all aspects of the same subject and the gardens provided material for the instruction of students of medicine and for research into the properties of medicinal plants. Taxonomy, in the sense of describing and naming plants and working out their natural relationships, formed at that time the basis of botanical studies. It was only logical, therefore, as botanic gardens developed and our knowledge of plant life extended from Europe and the Mediterranean that many botanic gardens became major centres for the study of plant taxonomy and systematics. Important herbaria and libraries were built up and as I have noted previously (Heywood 1987) the focus of research in botanic gardens gradually moved away from the living collections and focussed on taxonomic studies using the extensive herbarium collections to such an extent that for several major botanic gardens today their primary role is perceived as centres of taxonomic research.

While concern for the loss of habitats and species and the need for action to conserve them have been expressed for at least a century, it is only in the past three or four decades that conservation has become a prominent issue on both national and international agendas. Botanic gardens have generally been slow to recognize that they had a significant part to play in various aspects of conservation. In the early 1980s IUCN (today

IUCN - The World Conservation Union) had a sense that plants were being neglected in conservation work and together with WWF developed a joint Plant Conservation Programme aimed at asserting the fundamental role of plants in all conservation activities.

One of the six main themes of the original Plant Conservation Programme was to strengthen the role of botanic gardens which IUCN felt could and should become the specialist agencies for plant conservation. The subsequent creation in 1987 by IUCN of the Botanic Gardens Conservation Secretariat (now an independent body, Botanic Gardens Conservation International) and the publication of the Botanic Gardens Conservation Strategy in 1989 put in place the institutional structure and conceptual basis for botanic gardens worldwide to allow them in the words of the Declaration of Las Palmas (Bramwell et al 1987: 357), to work together to defend plant life for the benefit of all people now and in the future. Botanic gardens can be used to inform and educate; they are showcases for the plant world and places where science and people can meet and interact. They possess, therefore, many of the essential ingredients for offering environmental education, especially as regards plantlife, namely; an amenable location, a sense of dedication to plants and a wide array of plant material that can be used for teaching and instruction.

The diversity of botanic gardens

In considering the participation of botanic gardens in conservation education it has to be remembered always that individual gardens vary enormously in size, facilities, policy and resources. While a considerable number of gardens in North America, Australia and Europe, for example, have developed major education programmes for varying age groups and consider environmental education as one of their primary goals, others (including some leading gardens) devote only modest resources to this area and rely more on passive education than on any more interactive and structured approach.

Many of the newer gardens created recently in the tropics regard the involvement of the local community in the life of the garden as essential and treat environmental education, especially of children, as a priority, even though resources are extremely limited. This diversity in the types

and facilities offered by different gardens makes it difficult to generalize and great care must be taken not to assume that educational materials will be viewed or treated in the same way.

Also it is salutary to remember that different countries and races perceive the natural world, wildlife and conservation in often quite different ways. A recent study, for example, examines Japanese attitudes to wildlife and conservation and compares them where possible to those of the North American public (Kellert 1991). It found considerable differences between them in certain areas.

We need also to be sensitive to the well publicized differences in attitude on key environmental issues between the developed and the developing worlds which to some extent reflects the extent to which rural peoples are still dependent on agriculture for a living and on the availability of suitable land for growing crops and grazing their livestock.

Conservation issues and education

It is helpful to remind ourselves just how complex and controversial many environmental issues are. They occur at all levels, from attempts to preserve local populations of endangered species from extinction to the development of national conservation strategies and international efforts to preserve the global environment. Indeed the gradual internationalization of concern for the environment in the last decade is a new phenomenon (cf. Adams 1990; Mathews 1991) and one that gives cause for both hope and concern.

As in all other aspects of conservation activity, in planning environmental education programmes for botanic gardens, every effort should be made to present a balanced viewpoint (and perhaps even restrain ones campaigning zeal!) This is not always easy as much of the conservation literature is less than satisfactory in presenting certain issues and often there is a failure to use accurate and up to date information.

Some of the aims of environmental education are to instil a sense of care and concern at what is happening to the global environment, develop the concept of stewardship and to suggest what action the individual and the comunity can take. These need a reasonably good knowledge

and understanding of the major issues such as pollution, population growth (an exceptionally difficult issue), deforestation, protecting the ozone layer, energy and climate change, extinction of species and populations, genetic erosion, international regulatory mechanisms, sustainable use of resources, protected area systems, soil erosion and environmental economics.

The professional literature of conservation and the associated subjects of conservation biolgy and biodiversity has burgeoned during the past ten years and it might be useful to suggest key reference works of international stature that can be recommended. These include:

- The World Conservation Strategy (IUCN 1980)
- The Botanic Gardens Conservation Strategy (IUCN/WWF 1989)
- Conserving the World's Biological Diversity (McNeely et al. 1990.)
- Keeping Options Alive (Reid and Miller 1989)
- Biodiversity (Wilson and Peter 1988)
- Global Biodiversity Conservation Strategy (WRI/IUCN/UNEP 1992)
- Caring for the Earth (IUCN/WWF/UNEP 1991)

These will give a fairly balanced if "orthodox" overview of current perceptions of most of the major conservation issues. In addition reference should be made to any official national statements or strategy documents on conservation policy.

A number of myths have grown up around conservation and I believe we should all be careful to avoid propagating these. It is also desirable not to repeat hackneyed examples when most relevant and local examples can be used instead. An example is the repetition ad nauseam of the Rosy Periwinkle (Catharanthus roseus) as an example of a rare tropical medicinal plant species from Madagascar. While it is certainly an excellent example of a species which contains chemical compounds which led to the development of extremely valuable drugs for the treatment of childhood leukaemia, it also has to be remembered that it is a widespread tropical weed, not some rare forest endemic. Also continued reference to this species gives the impression that there are no other significant medicinal plant species worth mentioning. Most botanic garden educators will be able to refer to much better local examples of medicinal plants and demonstrate the problems of their

conservation. A good source of reference to the uses of medicinal plants and their conservation is the recently published volume Conservation of Medicinal Plants (Akerele et al. 1991).

Most summary lectures or reviews on conservation or the global environment tend to include reference to rates of deforestation, either global or of particular areas especially the Amazon basin, and predictions about the number of species that will become extinct within the next few decades. Both these are very difficult issues to present and to justify without a great deal of detailed knowledge and understanding. The risk is that by simply repeating a set of figures from such papers, questioners may successfully challenge by reference to other statistics. In the case of deforestation rates, care has to be taken to distinguish between loss of closed forest and any kind of forest cover and to define what is meant by deforestation: a widely used definition of forest loss is the conversion of forested lands to permanently cleared land for agriculture, pasture, industrial development or other uses, or to a cycle of shifting cultivation. It should also be recognized that even today with the use of satellite imagery, problems of interpretation still occur. There is still lack of agreement on the amount of forest loss in the Amazon and the amount of the Atlantic forest (Mata Atlantica) remaining is variously put at anything from 12% to 2%! These considerations are no reason for not referring to the serious global problems of deforestation nor of its consequences. Again while general reference to such problems may be important in some aspects of botanic garden education programmes, a focus on local examples will often be more relevant and meaningful to the target audience.

On the matter of extinction rates, a degree of prudence is also advisable. Despite the many assertions in the literature that if current rates of forest loss continue, then 60,000 species of higher plants "will become extinct" in 30 or 40 years time, it should be remembered that this and similar statements are simply predictions derived by extrapolation from species-area curves (the relationship between species richness and habitat area). Although it is incontestable that that many thousands of species will be committed to extinction sometime during the next century, there are so many uncertainties and variables that no precise figures can be given (cf Heywood and Stuart 1992). The fact that

recorded species losses are so far remarkably low only serves to reinforce the need for caution since actual examples to justify the high figures quoted are frequently requested. A subject that might be pursued through botanic garden education programmmes is a study of how it is that so many rare and endangered species manage to survive over such long periods.

Institutional policy

By drawing attention to these difficulties my concern is to highlight the highly complex nature of many conservation issues and the dangers of oversimplifying in certain situations. It is quite clear from the attitudes and actions of many governments that the conservation argument is far from won despite the growing weight of evidence about the deterioration of the environmennt. Those charged with educating the public on conservation issues at all levels and age groups carry an enormous responsibility. In many botanic gardens, by being able to work with other scientific and technical specialists, education officers have unrivalled opportunities not available to others.

Conclusions

Conservation education ideally requires the cooperation and involvement of all staff in botanic gardens. In some cases there may be a need to review staffing policies and increase the staff and resources made available for education programmes. Since the recognition of conservation as a major policy concern of botanic gardens is a recent development, and not yet accepted by all gardens, it is clear that a great deal of rethinking of institutional policies will be needed if botanic gardens are to play a full part in education and advocacy for a healthy environment. Education should be seen as an intrinsic and essential part of the mission of most if not all botanic gardens and not just an appendix grafted on.

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References

Adams, W M 1990. Green Development. Environment & Sustainability in the Third World. Routledge, London and New York pp 255

Akerele, O, Heywood, V and Synge, H(eds) 1991. Conservation of Medicinal Plants. Cambridge University Press, Cambridge. pp 362

Bramwell, D, Hamann, O, Heywood, V and Synge, H 1987. Botanic Gardens and the World Conservation Strategy. Academic Press, London. pp 367

Heywood, V H 1987. The changing role of the botanic garden. Bramwell, D, Hamann, O, Heywood, V and Synge, H (eds), Botanic Gardens and the World Conservation Strategy, 3-18. Academic Press, London

Heywood, V H and Stuart, S N 1992

IUCN 1980 World Conservation Strategy IUCN/UNEP/WWF Gland

IUCN/WWF 1989 BGCS IUCN, Gland

IUCN/UNEP/WWF 1991 Caring for the Earth IUCN, Gland

Kellert, S R 1991 Japanese perceptions of wildlife Conservation Biology 5: 297-308

Mathews, J T 1991 Introduction and overview. In: Mathews, J T (ed), Preserving the Global Environment The Challenge of Shared Leadership, pp 15-38, W W Norton & Company, New York and London

McNeely, J A, Miller, K R, Reid, W V, Mittermeier, R A and Werner, T B 1989. Conserving the World's Biological Diversity. WRI, IUCN, Conservation International, World Bank, Washington and Gland.

Reid, W V and Miller, K R 1989. Keeping Options Alive. The Scientific Basis for Conserving Biological Diversity. World Resources Institute, Washington DC.

Wilson, E O and Peter, F M (eds), 1988 Biodiversity National Academy Press, Washington DC

WRI/IUCN/UNEP 1992 Global Biodiversity Conservation Strategy WRI, Washington DC