

1. INTRODUCTION

The worldwide conservation effort has often been focused on a few “flagship” species. These species tend to be the large carnivores, such as lions and tigers, the primates, such as the mountain gorilla, and other mammals, for example the giant panda, or birds. There seems to have been no real scientific reason for selecting these species. Indeed, it is possible to criticise the selection as being driven by emotions, with the emotions controlled by apparently cuddly animals that are either furry or feathery. What we need to do is to find a much more scientifically rigorous and objective approach to the conservation of the world’s biota. Why is it that such large sums of money need to be spent on single mammal or single bird species when we know that tens of thousands of plants, invertebrates, or microorganisms are being lost year by year from the face of this planet? It is true that amongst the plants some have found favour, such as the orchids. Amongst the invertebrates, one or two groups, such as the butterflies and more recently the dragonflies, have found favour. And even amongst the microorganisms, some groups of fungi, such as the truffles, have aroused attention. However, all of these cases only highlight the difficulty of planning for conservation. Should our conservation efforts be focused on one or two popular species, or should they be focused on less popular species that may be more important in the whole functioning of the planet Earth?

The important aspect of the Trinidad meeting was that the focus was moved from the “flagship” species to those species which have a core function either ecologically or socio-economically. One realises that much less research is available on these species. They might not necessarily be those that arouse the public attention, but yet we, as scientists, believe that they are the most important species for the long term survival of *Homo sapiens* on this planet. Conservation must move from the emotionally-based activities of the past to the more scientifically-based activities of the future. All of this was recognised in the meeting held in the Republic of Trinidad & Tobago in March 1989. Very soon after the seminar a report was duplicated and circulated. This report has been slightly modified in forming Chapter 2 of the current report. It sets out the background to the Trinidad meeting, sets out 16 points which are required for action, but more importantly sets out a 12-point action plan for the future.

This action plan could be criticised as containing only pious words, a wishlist of the participants in Trinidad. However, there must be a greater sense of urgency and realism about the effects of human communities upon the natural biota of this planet. The first 5 of the 12 points are directed towards national governments and the agencies that those governments support. Governments are not only charged with a responsibility for conserving the species richness within their territorial areas, but they are also charged with a responsibility for using those biotic resources for the well-being, on a sustainable basis, of their indigenous populations. The mechanisms for doing this are multitudinous, ranging from the designation of sites for conservation and landscape purposes to the *ex situ* conservation of germplasm of the species which are currently, or are likely to be, of economic importance. And, above all, the inter-

relationships between the human societies and the biota throughout the territory administered by government or its agencies are important ingredients for sustainable development.

The Trinidad meeting did not just lead to another conservation report, but was a real move towards investigating how conservation and development are linked and integrated. In the words of the Brundtland Report, this would be “sustainability”. How does one conserve our natural heritage, whilst at the same time supporting the development aspirations of the human societies? For too long, development has been seen to ruin the natural environment, to pollute it, to lead to the loss of biodiversity both of species and genetic material, and indeed to stimulate the general degradation of this planet. If development leads to degradation, what will be the end point of those developments? Above all, the Trinidad meeting was concerned with sustainable development, how one finds a way of investing in the future in both economic and ecological terms, whilst sustaining the biota on which development depends.

But the recommendations are not just addressed to governments, since there are many partners in the new approach to conservation. There are international agencies, as well as the voluntary or non-governmental organisations. There is a community that is working on research, at the forefront of technology or ecological ideas, as well as the analysis of the sociology and economics of rural communities. The thoughts and results of this research community need to be harnessed, via policy initiatives, to help the governmental, multi-national and non-governmental institutions. In other words, the first paper dealing with the report from the Trinidad meeting highlights the need for a partnership approach, for a view of land use in a sustainable way.

There are then four papers that explore aspects of key species and their place in development. These four papers were invited to be written and presented at the Trinidad meeting. Professor John Harper analyses some biological aspects of key species. He views the subject in terms of the use made of these species by human communities. The greatest use is clearly that of food, be it of the seeds, the leaves, the roots or the reproductive parts of the species concerned. In a lengthy discussion, Harper analyses the difficulties of secondary compounds that make many plants toxic. How does one get around these problems, destroying the toxins and leaving the cell contents of the plant suitable for human food? But plants are not used as foods, because they also have a role in pharmaceuticals, for fuel, or in clothing and construction. One group of natural resources, should not, therefore, be forgotten in relation to the other natural resources of the planet.

It is these interrelationships between the species that form the focus of Professor John Lawton’s paper. He approaches a potentially difficult question in asking “what constitutes a key species”. Initial thoughts may focus on some of the more prominent or dominant species of communities, though Lawton reminds us that these may not be the key species that hold together the communities in which they occur. The example of a starfish which maintains species diversity on rocky intertidal seashores is important in demonstrating the role of a predator in preventing the competitive exclusion of some species from a community. His example of the desert snails, rasping away at the surface of a rock, is important in indicating how many other

species can be dependent upon this one species of phytophagous invertebrate. But above all, his paper warns us to beware of prejudging any situation. The most unlikely of species may turn out to be key species in the longer term, when sufficient research on the functioning of its ecosystem has been carried out.

Professor Tony Bradshaw focuses on just one group of potentially key species, those small microorganisms in the environment that fix atmospheric nitrogen. Many biologists were brought up to know something about the genus *Rhizobium*, forming root nodules with many leguminous species. Sure enough, these are included within Bradshaw's paper. Perhaps rather fewer people know about the genus *Frankia*, less well known but yet in some ecosystems particularly important again for fixing nitrogen. All of these microorganisms, associated with legumes or other higher plant species, are building up soil fertility, adding to the productivity of the biosphere. It is as well to remember that such insignificant species as these microbes may be tremendously important for the maintenance of many plant and animal communities.

However, it is Professor Ramakrishnan who reminds us of the social and economic contexts of many conservation activities. The agricultural cycle in many parts of the world is tremendously important, with land being left fallow for a while and then recultivated. What are the factors that lead to sustainable agriculture of this nature, requiring low inputs of fertilizer and insecticides, but in the long term continuing to be productive for the crops on which local populations of people depend? Ramakrishnan reminds us that conservation is not just for the scientists, not just for the élite who enjoy going and seeing a variety of species, maybe keeping their "life lists" of all species that they have seen. Conservation is much more integrated with the well-being of rural communities. Conservation is concerned with sustainable development, whilst at the same time preserving the biological diversity of communities, species and genetic material.

Many Commonwealth nations are thinking about the concepts that stemmed from this Trinidad meeting. Can one identify the key species in defined geographical areas? Five appendices are included in Part II; these are the first attempts to identify the key species in five Commonwealth nations. It must be remembered that these are first attempts, that in time other species may be added to these lists, or species included in the lists may be deleted because they are found not to be so important as was once thought.

But above all, the concept of key species, developed in this seminar held in Trinidad, is tremendously important in the evolution of conservation thinking. Conservation, and the related problems of sustainable development, needs to get away from the few "flagship" species and move towards a scientifically sound basis for its activities. If that sound basis identifies the key species, either ecologically for the functioning of the ecosystem or socio-economically for the well-being of a local community, then the Trinidad meeting will have achieved its objectives. And also, importantly, one must think in terms not of just species and the ecosystems but of the landscapes within which both the species and the ecosystems operate. Landscapes involve a mixture of different ecosystems, interacting with each other. It is not just the cultivated field, but also the hedge or stone wall or grassland baulk that surrounds

that field. It includes the small woodlands within the agricultural environment, as well as the wetlands and freshwater courses. How do all of these interact with each other? How do the species, the wild species, of the hedgerow or stone wall affect the potential pest populations that are damaging the crops? There is so much that we are glimpsing in the environment at the present time, and so many questions that remain to be answered. The Trinidad meeting, which is reported here, has focused our attention on identifying priorities, rather than just identifying those species which happen to capture the public's imagination.

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