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Woodland Research
in the Nature Conservancy

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Introduction

This short paper is a revised version of a note which was originally written for the Forestry and Woodlands Sub-Committee of the Natural Environment Research Council. It gives a preliminary description of the primary objectives which have been selected for the new programme of woodland research in the Nature Conservancy, and defines the research strategies which are proposed. Some indication is also given of the methods to be used in the control of the research programme, but these will be described in more detail in a later paper.

Basic Considerations

Research into British woodlands and forests is already being undertaken extensively in the Research Branch of the Forestry Commission and in several universities, and it is, therefore, necessary to give good reasons for a separate programme of woodland research to be carried out by the Nature Conservancy. Four basic reasons are suggested in justification of this separate programme. First, the Conservation Branch of the Nature Conservancy requires advice on the management of the woodland reserves for which it is responsible. This advice is not available from other sources and, because of the nature of the problems, is unlikely to be available unless the Research Branch of the Conservancy undertakes its own research.

Second, there is a considerable demand for advice from the Nature Conservancy on problems of conservation and management of woodland and its associated wildlife. The advice of the Nature Conservancy will only be of value if it is based on research involving many different disciplines. In general, the universities are not organised to provide research based on a wide spectrum of disciplines, or continuing over long periods of time on sites widely separated geographically. The Conservancy's Woodland Habitat Team is able to satisfy these requirements.

Third, while the Forestry Commission Research Branch has a clearly defined programme, there are several fields of research that are only marginal to the statutory and direct functions of the Commission, and many of these fields are unlikely to be taken up by the universities unless there happens to be a research post-graduate student available and interested in these fields. Examples of such fields of research are the study of sub-specific variation of woodland plant and animal species, investigation of the ecology of individual plant and animal species over a wide range of sites, the classification of woodland and potential woodland sites, and the monitoring of changes taking place in British woodlands as a result of forestry and agricultural practice, recreational pressures, etc. There are obvious advantages in having a research organisation available for undertaking such projects as they arise, and integrating the work carried out on allied topics in the universities. Indeed, the Natural Environment Research Council requires a body of scientists with practical experience in woodland research to advise the various committees on the value of the proposed research grants, and such scientists need the touchstone of their own research if their advice is to be relevant and valuable.

Fourth, the monitoring of changes which are occurring in woodlands should be undertaken by a team of scientists independent of any of the interested parties. This is not to say that the research workers of such organisations as the Forestry Commission would in any way modify the evidence about changes, but merely to say that justice must be seen to be done by laymen and that the evidence of an independent team necessarily carries more weight.

Primary Objectives

If the reasons for maintaining a woodland research team within the Nature Conservancy are accepted, the primary objectives of this team may be defined as:-

1. To undertake the research necessary for the efficient management of woodland reserves and sites of special scientific interest for which the Nature Conservancy and other bodies have responsibility.
2. To undertake the monitoring of the changes taking place in British woodlands as a result of forestry and agricultural practices, shooting tenancies, and recreational pressures, and to report these changes to the appropriate organisations.

Research Strategies

With these primary objectives in mind, three research strategies are proposed for the woodland Habitat Team of the Nature Conservancy.

1. The Study of Variation between Sites

The first strategy is concerned with the study of the variation of many variables between sites. The basic objective is to investigate the variation, the climate, physiography, soil physics, and soil chemistry over a wide range of sites, and also to investigate the response of woodland plants and animals to this variation. The practical end-result of this research is a classification of woodland and potential woodland sites for a wide variety of purposes, including productivity, ecological diversity, capability of regeneration, etc.

A programme of research on this theme is particularly appropriate at this point of time, apart from the long-established need for efficient site classification. First, the Forestry Commission is currently mounting an investigation into site classification related to yield of tree species of commercial importance, and it would be extremely valuable to undertake a joint project with the Forestry Commission on this subject. Second, the necessary statistical and computing tools for the successful completion of this research are now available for the first time.

The programme of research under this strategy now being planned at Merlewood is expected to be completed within five years. It will be undertaken in full co-operation with the Forestry Commission Research Branch, and results and methods will be interchanged between the two organisations. In the first three years of the project, the main concentration within the Nature Conservancy will be on woodland reserves and sites of special scientific interest, but in the fourth and fifth years of the project, the investigations will be extended to potential woodland sites and industrial sites respectively.

2. The Study of Variation within Sites

This strategy is sub-divided into two sub-strategies, the first dealing with spatial variation, and the second with dynamic variation.

(a) Spatial Variation

This investigation will be concerned with the variation of a wide range of physical and chemical variables on woodland sites, and their relationship to the plants and animals found on the sites. The aim is to define an objective method of monitoring the changes taking place on woodland sites by assessing, at a given point in time, the nature of the variation within the site. A wide range of techniques is currently being devised, including the use of aerial photography, ground survey, and computer mapping. It is intended that the monitoring technique should be applied to given sites at regular intervals, e.g. every ten or twenty years, or more frequently in cases of special interest, and that it should be capable of detecting relatively small differences.

(b) Dynamic Variation

On a smaller number of sites, the variation of an even wider range of physical and chemical variables will be investigated, with particular emphasis on the changes taking place from year to year, season to season, or even day to day. The aim of this research is to provide the information necessary to advise regional officers and others on the management of woodland to achieve declared objectives. The research will be directed towards the construction of mathematical models describing the variability and the relationships between processes involving the plants and animals. The resulting models will be used to train regional officers in woodland management, by direct simulation, and also for further investigation through such techniques as mathematical programming, stochastic processes, etc. The investigations at present being financed under the International Biological Programme fall within this strategy, and will be used as pilot studies for the investigations on a wider range of sites.

3. The Study of Variation between Individual Plants and Animals

As a complement to the other strategies, a series of investigations is also being planned into the variation which exists between individual plants and animals of the same species. Some of these investigations will be concerned with the study of sub-specific variation of native and introduced tree species, as an extension of work on the same species being carried out by the Forestry Commission and the universities. Other investigations will be concerned with the biology and ecology of individual species, but, again, with particular emphasis on sub-specific variation.

Dependence on Statistical and Computing Techniques

The programme of research defined by the three strategies above is designed to exploit the full range of statistical and computing techniques which has been developed over the last ten years. The research is dependent upon the provision of adequate computing facilities to enable the necessary calculations to be made, and to enable the data collected for the investigations to be stored and manipulated through computer-based data banks. In this way, it is intended to undertake a major programme of research with a relatively small staff, whose productivity will be enhanced by a modest investment in capital equipment.

It is relatively unusual for a programme of biological research to be planned so that the statistical considerations have been introduced into the strategy of research rather than into the tactics of the design of individual experiments and surveys. It is likely, therefore, that there will be particular interest in this aspect of the research programme which is proposed.

Control of the Research Programme

The individual projects making up the three basic strategies described in this paper are contained in the Project Register which has now been drawn up. This Project Register will be widely distributed to interested research organisations, as a means of informing them of the work which is being undertaken, and will be revised annually, to take account of changes in research thinking and the development of new techniques.

Each individual project will also be defined by a project plan and by a critical path network, with estimates of the resources required for the completion of the project. Summaries of these networks will also be made available to interested organisations, and the networks will be up-dated quarterly to show progress with the investigations and changes due to new developments. The networks also show the degree to which the many separate disciplines concerned are integrated into the projects, and it is hoped that research carried out by the universities can be similarly defined.

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