SILVICULTURAL SYSTEMS

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PREFACE

THE lack, in the English language, of any comprehensive work on silvicultural systems is a sufficient reason for devoting to this important subject the first of a series of manuals dealing with different branches of forestry, which will appear from time to time.

Forestry is now passing through a critical stage. The depletion of natural forests that has taken place during the past hundred years in many parts of the world gives genuine cause for alarm, and steps have been taken in many countries to conserve and protect at least some small proportion of their original forest area. This, however, is only an initial step; if the problem of future timber supplies is to be solved, it is also of the utmost importance that the reduced forest area now available should be treated in such a way as to produce the highest possible sustained yield of suitable timber compatible with economic and other considerations. Certain European countries were faced with this problem centuries ago, and as a result of long experience have evolved methods of treatment, termed ‘silvicultural systems’, which are an object-lesson to the whole world. The detailed study of these systems under as many different conditions as possible is the only means of acquiring that special knowledge which will lead to their intelligent application in practice.

Lest it may be held that systems which have been evolved in Europe are not applicable to other parts of the world where totally different conditions prevail, the fact may be mentioned that for more than fifty years past the silvicultural systems of Europe, with suitable modifications, have been applied successfully in many parts of India under a variety of conditions and in many types of forest; and it may be truly said that the great progress which forestry has made in that country during the past half-century has been due to a large extent to the fact that the officers of the higher branch of the Forest Service have received their practical training in the forests of continental Europe. The close study of European systems does not imply that they should be followed slavishly under all conditions; a proper understanding of these systems, however, is an essential preliminary to their adoption in such modified form as may be indicated by local conditions. In Great Britain the successful application of some of the systems would be impossible at present for two reasons: in the first place many British woodlands are in a derelict state through faulty treatment, and in the second place the country
is so infested with rabbits that economic forestry in any form is often
difficult if not impossible. If the rabbit scourge were eliminated and
the woodlands were brought into a better condition, there would be
no reason, in so far as soil, climate, and other factors are concerned,
why the silvicultural systems of continental Europe should not be
practised in Great Britain with results far more satisfactory from the
economic point of view than those attained under the methods so
frequently practised hitherto.

In preparing this book every endeavour has been made to eluci-
date principles by giving a sufficiency of actual examples, while
avoiding a superfluity of local detail which might tend to confuse
the reader. The plan has therefore been followed of explaining the
systems on general lines and giving only a few local examples to
illustrate important or special points. The historical information
given is necessarily brief, but it may prove of interest in throwing
light on the influences under which systems have been evolved,
developed, and in some cases superseded. French and German
terminology has been given with the object of assisting those con-
versant with these languages who may wish to study the literature
or visit the forests of continental Europe.

The application of silvicultural systems presents problems of an
essentially practical kind; hence the descriptions and discussions in
this book have been based as far as possible on the results of personal
investigations extending over a number of years in the forests of
several different European countries. Apart from this, experience
gained in India has proved invaluable in helping towards the appreci-
ation of the more important points connected with the introduction
and practice of silvicultural systems under conditions often very
different from those prevailing in Europe. Although every endeav-
our has been made to describe the various systems as they are
actually practised, and the descriptions have been supplemented by
photographs taken personally in different countries, the reader is
asked to regard this book not as a means of acquiring a complete
knowledge of silvicultural systems, but rather as a guide towards
the practical study of systems in the forest.

R. S. T.

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I

INTRODUCTION

A silvicultural system may be defined as the process by which the crops constituting a forest are tended, removed, and replaced by new crops, resulting in the production of woods of a distinctive form. In this definition tending refers mainly to thinning operations carried out in immature woods, in so far as these operations affect the state of the crop and soil at the time of regeneration.

A silvicultural system embodies three main ideas: (1) the method of regeneration of the individual crops constituting the forest, (2) the form of crop produced, and (3) the orderly arrangement of the crops over the forest as a whole, with special reference to silvicultural and protective considerations and the economic utilization of the produce.

A study of silvicultural systems presupposes a knowledge of the principles of silviculture, while the application of these systems in practice is closely connected with the requirements of forest management.

Forest management teaches us the great economic advantage of regular sustained yields over intermittent or spasmodic yields. With the object of ensuring future sustained yields the ideal of the normal forest has been created. Such a forest contains a regular and complete succession of age-classes from the youngest to the oldest; the several age-classes are represented in correct proportion, density, and distribution, so that as each becomes ripe for felling it may be cut in its proper turn and regenerated, and the outturn will be equal each year or period of years so long as the normal state of the forest is maintained. The normal forest can hardly be said to exist in reality; rather it should be regarded as an ideal to be aimed at, and approached as nearly as possible, in any scheme of forest management aiming at sustained yields.

Since the practical application of silvicultural systems is closely connected with the requirements of forest management, the ideal of the normal forest has to be kept in mind in applying a silvicultural system to any regulated scheme of management which aims at this ideal. In the application of a silvicultural system to such a scheme there are two main aspects to consider: (1) the general framework of the scheme, including the division of the area, the allotment of areas for felling, and the regulation of the yield; these
are essentially questions of forest management, and do not concern us here except in so far as they may affect questions of silviculture, protection, and economic utilization; (2) the technique of the system itself, including the conduct of fellings, regeneration, and tending operations; it is with the latter that we are primarily concerned.

Various classifications of silvicultural systems have been proposed. If we take into consideration all the variations of treatment that are in use at the present day or have been practised in the past, there is scarcely any limit to the number of these variations. It is therefore necessary to group the various forms of treatment into what may be termed main systems, and to devise a general classification of these. Opinions differ considerably as to how such a classification should be made, but for our purpose the following will be suitable:

I. High Forest Systems. Crops normally of seedling origin.

A. Felling and regeneration for the time being concentrated on part of the forest area only:

1. Old crop cleared by one single felling: resulting crop even-aged.—Clear-cutting system.

2. Systems of successive regeneration fellings.1 Old crop cleared by two or more successive fellings: resulting crop more or less even-aged or somewhat uneven-aged:

(a) Regeneration fellings distributed over whole compartments or sub-compartments:

i. Opening of canopy even: young crop more or less even-aged and uniform.—Uniform system.

ii. Opening of canopy by scattered gaps: young crop more or less even-aged.—Group system.

iii. Opening of canopy irregular and gradual: young crop somewhat uneven-aged.—Irregular shelter-wood system.

(b) Regeneration fellings confined to certain portions of compartments or sub-compartments at a time:

i. Fellings in strips.—Strip systems (various).

ii. Fellings beginning in internal lines and advancing outwards in wedge formation.—Wedge system.

B. Felling and regeneration distributed continuously over the whole area: crop wholly uneven-aged.—Selection system.

1 Shelter-wood systems is a general term which comprises systems under A 2 and B.
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C. Accessory systems, arising out of other systems:
   1. Form of forest produced by introducing a young crop beneath an existing immature one.—Two-storied high forest.
   2. Form of forest produced by retaining certain trees of the old crop after regeneration is completed.—High forest with standards.

II. COPPICE SYSTEMS. Crops, in part at least, originating from stool shoots (coppice) or by other vegetative means:
   A. Crop consisting entirely of vegetative shoots:
      1. Crop removed by clear-felling, even-aged.—Coppice system.
      2. Only a portion of the shoots cut at each felling; crop uneven-aged.—Coppice selection system.
   B. Crop consisting partly of vegetative shoots, partly of trees, generally of seedling origin.—Coppice with standards system.