CHOICE OF SYSTEM

The choice of a system for adoption in any given locality involves a careful study of the conditions applying to that locality. The factors to be taken into consideration fall for the most part under two main heads, silvicultural (including protective) and economic. These are sometimes directly antagonistic to each other, so that although a system may be entirely suitable from the silvicultural point of view, it may be inapplicable owing to its economic disadvantages, and vice versa. The more important factors which influence the choice of a system are (1) conditions of regeneration, (2) conditions of growth, (3) nature of terrain and soil, (4) protection against external dangers, (5) personnel and labour, (6) nature of produce required, (7) economic considerations, (8) transport conditions, (9) questions of rights, (10) aesthetic considerations. Factors Nos. (1) to (4) are primarily silvicultural and protective, and Nos. (5) to (8) economic. These factors may be considered in turn, with a few examples.

Conditions of Regeneration. Since coppice systems are limited to those species which coppice successfully, we may confine our attention to regeneration from seed. Where conditions of seeding and germination are specially favourable, systems involving natural regeneration over large coupes may be employed with success, as in the case of the uniform system in the oak and beech forests of W. France, or the clear-cutting system with natural regeneration in the maritime pine forests of the Landes. Where these conditions are unfavourable or variable, systems involving regeneration over smaller units of area are indicated: thus where the seeding is sporadic or irregular, the selection or irregular shelter-wood systems would give better results; or, where the sun exercises an adverse influence on natural regeneration, Wagner’s Blendersaumschlag, or some shelter-wood system with a long period, may be employed. Under one and the same system the character of the seed influences the form of the seeding felling, which should be more open in the case of light winged seeds than of heavy seeds. In the case of woods which have been rendered derelict through faulty treatment, and contain few good seed-bearers and many weed-covered blanks, systems involving natural regeneration are usually out of the question, and the clear-cutting system with artificial regeneration may be the only possible system to adopt.
Conditions of Growth. Light requirements, rate of growth, and other factors influence the choice of a system in relation to individual species or mixtures. The selection and irregular shelter-wood systems favour shade-bearers against light-demanders. Strong light-demanders are best adapted for the clear-cutting system, the clear-strip system or some short-period shelter-wood system, with very open seeding fellings. Two-storied high forest allows of two species of different rates of growth being grown together provided the species of slower growth is a shade-bearer.

Nature of Terrain and Soil. The clear-cutting system should be avoided on land subject to erosion, landslips or avalanches, in water catchment areas, and in places where the soil is liable to deterioration if exposed; the most suitable systems for such places are those which afford continuous protection to the soil, such as the selection system, the irregular shelter-wood system, or two-storied high forest with a soil-protective under story. On rocky or precipitous ground, where regeneration takes place only in occasional pockets of soil, the selection system is indicated. The soil, in affecting the choice of species, may thereby affect the system adopted; for instance, basket-willow coppice is grown on fertile alluvial soils, while on poor sand and gravel which supports Scots pine, some short-period system, or the clear-cutting system, is indicated. In Europe coppice with standards is generally confined to soils of at least moderately good quality.

Protection against External Dangers. In regions subject to storms the uniform system is usually considered unsuitable owing to the risk involved in isolating single trees, particularly of shallow-rooted species: the group system may also be ruled out owing to the danger involved in creating numerous gaps. In Europe the measures taken to counteract storm damage include the adoption of uneven-aged systems, or the wedge system, or the strip or clear-cutting systems with fellings proceeding against the prevailing storm direction. Where snow damage is prevalent, uneven-aged systems, such as the selection or irregular shelter-wood systems, are considered safer than even-aged systems. Damage by frost and drought is guarded against by adopting some shelter-wood system, or strip fellings proceeding from north to south: two-storied high forest also enables a sensitive species to be grown under protective cover. The clear-cutting system involves undue risk in the case of sensitive species. Experience in India has shown that coppice with standards is more subject to damage by drought than high forest. Where deer are prevalent coppice may be out of the question. So
far as insect damage is concerned, the clear-cutting system may be
inadvisable in places where clearings tend to encourage the multipli-
cation of injurious insects, or it may be practised with a special
arrangement of coupes (p. 6). Fire risk may necessitate the leaving
of standards as insurance trees (p. 42); the question of fire risk in
selection and even-aged forest has been discussed on p. 114.

Personnel and Labour. Simplicity of working is a great ad-
antage from the point of view of management and control. In this
respect the clear-cutting and simple coppice systems stand out by
themselves, because they entail no marking of trees for felling or
reservation, and require the minimum amount of skill on the part
of the manager. If correctly applied, the selection system is
probably the most difficult of all systems, while the marking of
standards over coppice is tedious and by no means easy if carried
out correctly. In the case of the various systems of successive re-
generation fellings in high forest, the skill necessary varies a good
deal with the ease with which regeneration can be obtained. In
general the short-period systems are simpler than the long-period
systems; in the former the work is more concentrated, and the sup-
vision of fellings and of cultural and tending operations is thus
facilitated. Among the short-period systems the group system is
more difficult to control than any of the other systems owing to
the scattered nature of the fellings and centres of regeneration. In
skilled hands elasticity of working, up to a point, is a good thing,
but in unskilled hands it may lead to serious mistakes.

From the psychological point of view short-period systems, in
which the aim is to regenerate definite areas within a limited time,
have an advantage over long-period systems, the importance of
which should not be overlooked. Short-period systems, in which
the manager can see the results of his work, promote a sense of
responsibility and joy of accomplishment which cannot be stimu-
lated to the same extent by systems in which the regeneration of an
area is spread over a period covering the term, even under the most
favourable conditions, of two or three managers. The selection
system is the most unfavourable of all systems in this respect.

So far as labour is concerned, simplicity and concentration of
work are alike advantageous. The clear-cutting system requires no
special skill, and no precautions are necessary to avoid damage to
young crops during felling, whereas under the selection and irregular
shelter-wood systems the reverse conditions are met with. Under
the latter systems great care is necessary to avoid damage to groups
of young growth during felling and extraction, particularly on steep
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slopes, and the wood-cutter is frequently hampered by irksome rules
and by the fear of incurring penalties in case of damage to the
growing stock; this, combined with the discomfort of working
among dense and often wet thickets, makes the uneven-aged systems
more unpopular from the labourer’s point of view than the even-
aged systems, and particularly the clear-cutting system. Among
high forest systems, so far as avoidance of damage during felling
and extraction is concerned, next to the clear-cutting system the
wedge and strip systems are the most favourable. As regards the
amount of labour required per unit of outturn, coppice with stan-
dards requires more and the clear-cutting system with natural
regeneration less than any other system.

Nature of Produce Required. So far as the demand for produce
is concerned, coppice may be sharply distinguished from high
forest; the former is indicated where there is a special demand for
firewood or hardwood poles of small to moderate size, and the latter
where the demand is primarily for large timber or for coniferous
pulpwood or poles. Coppice with standards is suitable for meeting a
mixed local demand for firewood together with poles and a certain
amount of timber of larger diameter. So far as high forest systems
are concerned, if the demand is for clean cylindrical timber of good
quality, the more even-aged systems are preferable to the more un-
even-aged ones; the former also yield a larger quantity of poles
from thinnings, and are therefore indicated where there is a demand
for this class of produce, including pulpwood and mining timber.
The trees produced by the selection system are generally more
tapering and branchy, and the growth of the timber is more uneven,
than in the case of even-aged systems. In Europe the selection
system is frequently employed in small private or village forests
where there is a local demand for timber of various sizes. Where
straight clean timber of specially large size is required, high forest
with standards and two-storied high forest are useful systems.
Where coniferous forests are grown solely for pulpwood or mining
timber, the clear-cutting system with artificial regeneration is often
the only one feasible, since trees producing material of the size
required are frequently too young to furnish natural regeneration.
This system is also commonly applied where a complete change of
species is desired, but if the new species is a sensitive shade-bearer
it may be introduced artificially under one of the shelter-wood
systems or as an under story in two-storied high forest.

Economic Considerations. From the economic point of view
concentration of work has a decided advantage over diffusion of
work; it cheapens the cost of felling and extraction, of cultural and tending operations, and of supervision generally. From this point of view the clear-cutting and simple coppice systems are the most favourable and the selection system the least favourable of systems. Of other high forest systems those with short regeneration periods are more advantageous than those with long periods, since they represent greater concentration of work. Experience in India has shown that a change from selection fellings to concentrated regeneration fellings has usually resulted in a marked rise in the money yield of the forest owing to the reduction in the cost of felling and extraction. Concentration of work may justify the construction of tramways, ropeways, or other works which would be out of the question where the selection system is in operation. Economically the clear-cutting system possesses a further advantage over other high forest systems, in that working costs are reduced owing to the fact that there is no marking of trees prior to felling.

The financial advantage secured by substantial early returns, which is of particular value to private owners, is more marked in some systems than in others. Coppice, and to some extent coppice with standards, have special advantages in this respect, while they also involve a comparatively small outlay of capital. Among high forest systems, two-storied high forest provides substantial early returns from the heavy thinnings carried out at the time the lower story is introduced. Of other systems, the more even-aged systems as a rule furnish early returns from thinnings in greater quantity than the more uneven-aged systems. The clear-cutting system with artificial regeneration may be employed, as in the spruce forests of Saxony, to secure the highest financial returns by adopting a short rotation, though from the silvicultural point of view this may lead to trouble (pp. 18–21).

**Transport Conditions.** Certain systems can be applied successfully only if there is a good system of roads or tracks whereby produce can be removed without damage to young crops. This applies particularly to systems, such as the clear-cutting or strip systems with horizontal coupes in hilly country, where cutting sections should be bounded by graded roads at no great distance from each other (see pp. 9 and 86 and Figs. 4 and 40). Coppice and coppice with standards in particular require a good network of roads and tracks, since the coupes are generally of small size, and extraction through growing coppice has to be avoided. Where transport conditions are backward, rendering forest tracts somewhat inaccessible, the extraction of anything but large timber may be unremunerative;
in such a case selection fellings may be the only means of working the forests.

Questions of Rights. The existence of rights of user, particularly as affecting the class of produce to be furnished, may influence the choice of a system. In the case of grazing rights, where definite areas have to be closed for regeneration, short-period systems and the clear-cutting system are preferable to long-period systems and above all the selection system, in which regeneration for the time-being extends over a considerable portion or the whole of the forest.

Aesthetic Considerations. From the aesthetic point of view those systems which maintain a continuous forest cover, and particularly the selection system, are preferable to those in which periodical clearings are made, such as the clear-cutting and simple coppice systems. In Europe a belt of forest treated under the selection system is often maintained round the outskirts of towns and villages.