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PROGRESS ACHIEVED BY THE NON-SELF-GOVERNING TERRITORIES IN PURSUANCE OF CHAPTER XI OF THE CHARTER

FORESTRY

Report prepared by the Food and Agriculture Organization

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NOTE: The following symbols are used:

Three dots	(...)	data not available
Dash	(-)	magnitude nil or negligible
Slash	1948/1949	crop or financial year
Hyphen	1948-1949	annual average

I. GENERAL CHARACTERISTICS OF THE PERIOD

1. As the result of an increase in the means made available to the forestry services of the Non-Self-Governing Territories between 1946 and 1956, considerable progress was made in giving effect to measures for safeguarding timber resources and developing forest production.

2. The degree of progress has, however, been limited, since the means available have not been in proportion to the extent of the problems involved. The progress achieved cannot, by itself, explain the particular importance that will certainly be attributed to the period under review when the history of forestry in these Territories is one day written. The most decisive factors for the future seem, indeed, to have been:

(a) The introduction of new technical methods ensuring considerably increased productivity, and their application to forestry experience, the evaluation of resources and the utilization of products;

(b) The progress achieved in research.

3. The effect of these factors, which became increasingly perceptible toward the end of the period, has been a fundamental revision of silvicultural concepts and methods. What could rightly be considered Utopian in 1946 now appears to be feasible within a relatively short period, namely, the replacement of far-ranging forestry services mainly aimed at more or less effectively regulating the primitive utilization of a small part of the resources of the wild forest, by true silviculture aimed at obtaining the maximum economic profit from a forest under management.

4. Although the progress achieved, during this period, in silviculture and stand management has admittedly been on a modest scale and does not with any certainty even foreshadow the silvicultural conceptions of the future, the experiments initiated and the more or less successful, tentative efforts that have been made provide elements that can be used for working out a forest policy aimed at production.

II. INTENSIFICATION OF FORESTRY WORK

5. This has been evident, in the first place, in a more definite awareness of the role of the forest in the balance of nature and as a factor of economic

prosperity. Faced with the rañid dwindling of resources that were being exploited without regard to the future, and with increasing pressure on the forests from what in some cases has been a massive population growth, most Governments have recognized the need for a "precise, firm and final" definition of forest policy. They have laid down the principle that forest policy, while allowing for the present needs of the Territory, should at the same time make provision for reserving a portion of the forest resources so that, in the future, there will be a permanent source of timber and of other forest products.

6. Forest policy has been clearly defined in the declarations made by several Governments. This is not yet the case everywhere, however, and several reports express the hope that the policies already formulated by the forestry services will soon be given official approval (e.g., Kenya, Southern Rhodesia).

7. As a means of giving effect to the forest policies thus defined, adequate legislation, or a considerable revision of existing legislation aimed at increasing its effectiveness, was passed during the period under review in the following instances: French Equatorial Africa (Decree of 20 May 1946 laying down a system of forestry regulations), Belgian Congo (Decree of 11 April 1949), Sarawak and British Guiana (Forest Ordinance of 1953), British North Borneo (Forest Ordinances of 1954), Territories under French administration (Decree of 22 January 1954 reorganizing the forestry services), etc. These laws are mainly concerned to ensure as far as possible that certain areas are reserved permanently for forest production, a safeguard without which no long-term silvicultural plan is feasible.

8. Another evidence of the intensification of forestry work was the remarkable increase in the resources made available for this purpose, especially in regard to staff and financing.

9. Staff. Departments concerned exclusively with forestry have been established in several Territories since 1946 (for example, Northern Rhodesia, Chad, Ubangi-Shari), and in other cases the forestry services have been put on a separate footing in relation to the agricultural services (Belgian Congo, 1947). There has almost everywhere been a considerable increase in staff since 1946 supplementing the additional staff which from 1939 onwards had already become available by the beginning of the period under review. This has been especially

true of staff at the officer level (for the whole of the African Territories under French administration there were twice as many officers in 1946 as in 1939, and four times as many in 1956; in Northern Rhodesia, the number of officers increased from three in 1946 to thirty in 1956, and in the Northern region of Nigeria, from nine in 1946 to twenty-two in 1955 (out of forty-eight provided for in the manning table)).

10. Nevertheless, the available staff is still far below what is needed for silviculture as practised in the temperate-zone countries. Despite the improvement achieved, the forester must still, more often than not, be satisfied with empirical methods of treatment and with working cautiously in an unfamiliar environment. The lack of competent technicians and of trained and experienced field workers has made it necessary to revise or extend many plans (in 1948, only 40 per cent of the forest development budget of French West Africa could be utilized). The Governments have given the matter careful thought and have endeavoured to broaden the recruitment of indigenous subordinate staff and to improve the training of field workers. Some of the locally recruited subordinate and senior staff are being sent to forestry institutes in the mother countries (the Des Barres and Nancy schools in France, universities in the United Kingdom, etc.). Forestry schools for the training of forest guards, rangers, wardens and assistants have been functioning in several Territories (Nigeria, French West Africa, Nyasaland, Uganda, Madagascar). Elsewhere, as in the Belgian Congo, the agricultural schools comprise forestry departments. At the same time fellowships have been provided to improve the vocational training and work efficiency of the indigenous staff and, in some cases, of the lumbermen and sawmill workers.

11. Progress in this direction, however, is hampered by the difficulty of finding qualified instructors who, in most cases, can only be provided by drawing on the already insufficient staff in the field.

12. In any event, responsibility for the technical aspects of forestry work in the Territories as a whole rests almost entirely on the senior staff supplied by the administering Powers. This situation is bound to give rise to concern now that the Territories are becoming self-governing. Only if qualified indigenous workers are available to replace the European technicians can the success of the present forest policy and of the large investment that has been made be assured.

13. Financing. Forestry operations have, for the first time, been assisted both by large-scale financing and by long-term planning.

14. The revenue from taxes levied on timber and secondary forest products has increased, since production, as will be seen below, has in many cases risen very considerably. Forest investments (reforestation, improvements, capital equipment) have been financed out of special funds. The United Kingdom Colonial Development and Welfare Fund provides for the allotment of £3,663,000 to forest development programmes covering a ten-year period, an amount representing 1.8 per cent of the total assets of the Fund and a little over 10 per cent of the sums allocated for agricultural development plans.

15. The FIDES[1/] has played a comparable role in regard to the Territories under French administration for which ten-year plans have been drawn up. In French Equatorial Africa, for example, 782 million francs CFA have been assigned for the improvement of forests, wild life and the tourist trade, this representing 2 per cent of the total amount provided for economic development. In the Belgian Congo, a ten-year social and economic development plan has also made possible the drawing-up of ten-year plans for forest improvement and erosion control.

16. Some reports, however, still complain of the annual nature and uncertainty of the regular resources, which in some instances, as for example in the Federation of Malaya, have given rise to suggestions for the establishment of a "Forestry Fund" as being the only effective means of supporting long-term forestry work.

17. It is noteworthy that in some Territories reforestation operations have been financed by earmarking special financial resources for that purpose. In the Belgian Congo, a 20 per cent tax on the royalties paid by operators has been devoted to restocking the forests. In Northern Rhodesia, the royalties are paid into a special reforestation fund, separate from the budget, and can thus be used in their entirety for improvements.

1/ Fonds de Développement Economique et Social des territoires d'outre-mer.

III. FURTHER FACTORS OF PROGRESS

18. The forester's main difficulty, which consists in his imperfect knowledge of the topography, composition and resources of the forest, has been considerably reduced in the period of a few years by the use of aero-photogrammetry for forestry purposes. This work, which is entrusted in some Territories to specialized interpretation departments, has involved the use of small-scale coverage or special photos for forestry purposes on a scale ranging from 1/10,000 to 1/30,000. It has:

(a) Made it possible to speed up the compiling of forest maps (3.8 million hectares in four years in British North Borneo);

(b) Guided operations for the reconnaissance and delimitation of the forest reserves;

(c) Shown the influence of climate and soil, the role of topography and the progress of erosion;

(d) Made possible a saving of time and money in mapping out roads for the removal of timber, and in laying out fire lines.

19. Aero-photogrammetry is also destined in the near future to play an essential role in the utilization of the forest by facilitating the preparatory operations for the management of vast forest areas. Combined with soil sampling (at the rate of one to five samples per 100 units), it provides the basis for an inventory of a forest's natural potentialities and utilizable resources as an indispensable prerequisite for sound management. Although the details of these methods have still to be perfected, certain types of forest have already been identified with sufficient accuracy, and rapid estimates of some resources have been successfully carried out (for example, okoumé, limba in Gabun; belian in Sarawak).

20. The rapid rise in the number of tractors in use in forest areas (for example, 100 forest tractors at the end of the period in the Libreville estuary, which had only a few units in 1946) has revolutionized the methods of timber extraction and, as a result, the very basis of logging operations. Whole trunks can now be brought right up to well-equipped mechanical cross-cutting camps (a D.8 caterpillar equipped with a logging arch can easily haul trunks weighing fifteen tons).

21. More and more electric chain-saws are being used for cross-cutting, and loading is done by means of cranes or log hoists.

22. The tractor has become the all-purpose implement of the operator and is particularly useful for the rapid opening-up of the haulage roads which tend to replace the costly narrow-gauge railways (caterpillar tractors equipped as bulldozers or angle-dozers, scrapers, motor-graders). These roads facilitate logging operations and the siting of processing plants and thus create favourable conditions for a more intensive utilization of the forest resources.

23. The establishment of sawmills with the most modern equipment, of plants for the manufacture of plywood, ground wood and excelsior, and of pilot plants for the production of pulp has extended the range of economically useful forest products. Together with the increased facilities for felling and haulage, this development has led the operators to take an increasing interest either in certain species or in size grades previously neglected. In some areas close to the mills the practice of extracting single trees here and there is beginning to be replaced by logging over a smaller area, where a larger portion of the resources is marketed.

24. Some silviculturists are thus led to foresee a fundamental change in the next few years in the purposes for which the forest is used. Whereas hitherto - apart from the requirements of domestic and local consumption - attention has been devoted almost exclusively to exportable sawn timber of the valuable species, the forest may tomorrow form a reservoir of raw material supplying a thriving local processing industry. If this is indeed so, the problem of forest management assumes a completely different aspect, for the rapid development of industrialization stabilizes the value of products and makes possible investments which might previously have been considered unlikely to yield a profitable return. Moreover, since a much greater portion of the stand on a single plot is logged and the products of thinning are merchantable, the difficulties encountered in ensuring the regeneration of the so-called valuable species cease to be decisive.

IV. DEVELOPMENT OF RESEARCH

25. The expansion of research activities is reflected in the first place by the general increase in the number of research workers. There has thus been an increase in the staff of specialized institutes such as the Centre technique forestier tropical in Paris and of forest research departments having experimental stations scattered over an entire territory (twelve research workers at the Institut national pour l'étude agronomique of the Belgian Congo, research departments of French West Africa, French Equatorial Africa and Madagascar (thirty stations in 1956), the Alaska Forest Research Center, etc.). There has also been an increase in staff through the assignment of officers specializing in experimentation (co-ordinated, for the Territories of British East Africa, by the Forest Bureau of the East African Agriculture and Forestry Research Organization).

26. Basic research obviously continues to be given priority in these areas, where the primary need is to obtain as rapidly as possible a better knowledge of the forest environment. Progress has been made in the study of forest species (tree identification and distribution, biology and ecology), vegetation patterns and development, types of forest, forest dynamics and forest regeneration.

27. The natural environment has been the subject of microbiological, mycological, entomological, soil and climate studies.

28. Of particular importance is the research on wood technology and utilization which, although still in the initial stage, has been given special attention (especially by the Centre technique forestier tropical in Paris (1953), the Committee for Timber Research of the Institut national pour l'étude agronomique of the Belgian Congo, etc.). This type of research is a prerequisite for the utilization of a greater number of species in the future and will therefore have a decisive effect on the line of action to be taken by forest management experts and silviculturists.

29. The attention of research workers has not, however, been limited to the laboratory but has also been directed to practical experiments in the field, mainly in connexion with natural regeneration, improvements in dense forest, artificial restocking, the effects of protection against fire and early burning and forest management.

V. UNFAVOURABLE FACTORS

30. Some factors have hampered progress and are likely to continue to do so in the years to come.

31. One of these factors is population growth. Thus, apart from areas where the population density is very low in comparison with the extent of the timber resources, the pressure to which the forest is being subjected by urban growth or by a rapidly expanding farming population (rate of increase in the Federation of Malaya 3 per cent, in the Belgian Congo 2.2 per cent) has become accentuated.

32. Economic development and the rise in the level of living have led to an increased demand for forest products for building purposes, furniture making, the construction of transport routes and port facilities. At the same time, with local industry undergoing expansion and the export trade being increased as much as possible in order to provide the Territories with the revenues required for their development, the demand for lumber reached record figures: for the Federation of Malaya the figure in 1956 was five times greater than that of twenty years ago. In the same year Madagascar imported 6,400 tons of wood and wood products whereas its exports dropped to 160 tons, as against 459 tons in 1946. While the consumption of wood for heating and for fuel has had a tendency to level off and even in some Territories to decrease owing to the substitution of diesel oil and electricity, the supply of firewood is still critical in the vicinity of some large towns and for some railways.

33. The increased demand for arable and pasture land, however, has endangered the remaining forest stands in some already impoverished areas. Since even under the best conditions the use of mineral or organic fertilizers has not gone beyond the stage of large-scale experimentation, the forest remains the great reserve of fertile land. The increase in herds and flocks and the progress achieved in the control of livestock diseases have resulted in the overstocking of grazing land. It has thus been increasingly difficult to protect the forest resources. It should be pointed out, however, that while the urban expansion resulting from industrialization raises problems in regard to the supply of wood, it sometimes has the favourable effect of drawing off a part of the rural population and of thus relieving the forest to some extent. In Sierra Leone, for example, the attraction of the diamond and iron mines should help foresters to establish reserves where the forest can be restocked or improved.

34. Taking into account population growth, the pressure to which the forest is subjected by the migrant farmer and the herder can only diminish in so far as a more remunerative and concentrated system of agriculture making use of irrigation, fertilizers and mechanization takes the place of the traditional methods of land use. The progress achieved in this direction is still, for the most part, on the scale of pilot experiments (for example, rice fields in the irrigated low valleys of Casamance and Madagascar, which have taken the place of the dry-farming crops of the plateaux).

35. In some cases, the publicity carried on in favour of certain remunerative crops has had unfavourable consequences for the wooded areas. This has been the case in the ill-advised expansion of the cultivation of ground-nuts (Senegal, Sudan), of cotton on sloping land in the Sudan, of mountain rice in Gabun and of maize in Madagascar. The result has been depletion of the soil over extensive areas to the point of complete sterilization. Such errors are now recognized by the agronomists themselves, who are endeavouring to orient cultivation toward crops that will not have an adverse effect on the fertility of the soil. Bush-type crops (coffee, cocoa, vanilla, cloves), by ensuring better remuneration for the farmers, have helped to restrain the demand for new land for extensive cropping. As, however, these crops require considerable light, they have led to the disappearance of further forest areas (French West Africa, Sierra Leone, Madagascar).

36. Forest authorities in general are becoming more and more convinced that an effective forest policy can only be developed within the wider framework of a rational land-use policy. In the tropical zone, some of the forestry departments consider it desirable to reserve from 25 to 30 per cent of the total land area to forests, which would be scattered throughout the Territory to the extent that conditions favourable to forest growth allowed. The need for close co-ordination of efforts to increase agricultural production both in quantity and in quality and for study of the possible effects on the conservation of natural resources can only be met if there is a greater measure of co-operation between agronomists and foresters. This need has been reflected in the wish expressed in several reports that committees for "rational land use" or for the "co-ordination of rural progress" should be set up. Some committees of this kind are already functioning and include representatives of the forestry services (Natural Resources Boards in several Malay States, Sarawak, Uganda, etc.).

37. Publicity aimed directly at the local inhabitants in an effort to give them a better appreciation of forestry problems and to elicit more active support for forest policy has taken such widely varied forms as contacts with the local authorities, instruction in schools, pamphlets, films, radio, mobile demonstration units and Arbor Days. These efforts have generally been disappointing, for such measures as the closing-off of forests as reserves, the prohibition of brush burning and the restrictions imposed on grazing and other customary rights run counter to the traditional practices of the farmer and what he regards as the only way in which he can meet his increasing needs.

38. Several Territories have included among their forest policy objectives that of gradually inducing the indigenous authorities to accept responsibility for certain forests while benefiting from the technical advice of the forestry service. This proposal, which is designed to make the indigenous authorities directly aware of forestry problems, has led to the establishment of indigenous reserves or the formation, by means of afforestation, of small communal forests to meet local requirements. In some Territories, the responsibility for these "small forests" has already been entrusted to the local authorities (for example, in Uganda, where the district forest officer may be a mere technical adviser or a person having real executive authority). In other Territories (Nyasaland), this responsibility is given to a special branch of the forestry department, or else the "small forests" are managed like the government forests, the income alone going to the community. Some Governments, on the other hand, have already been compelled to revise the arrangements that had been adopted along these lines because they found that much still remained to be done beforehand in acquainting the local inhabitants with forestry problems. In Nyasaland, a decision of 1947 giving the indigenous authorities supervisory responsibility over palm groves in the southern province had to be rescinded in 1955, because considerable areas of palm groves had been destroyed through lack of supervision. Likewise in the Eastern Region of Nigeria, the 1955 revision of the arrangements made in 1946 marked a distinct retreat from the provision that the supervision and management of forest resources would under government control be entrusted to the indigenous administrations wherever they were competent and willing. In some Territories (for example, Northern Rhodesia), there has been applied the system of paying an annual salary to local chiefs for supervising and protecting private forests against fire, a larger annual bonus being granted if the work has been satisfactory.

39. It is now generally recognized that the most effective publicity device is to provide a way for the indigenous inhabitants to participate in the forest revenues. Regulations adopted in the Belgian Congo in 1949 provided that the proceeds from fellings would be shared between the Congo Treasury and the local communities, the latter receiving a percentage proportionate to the size of the forests growing on land of which the indigenous inhabitants are the customary owners. Their rights to such revenue will be progressively limited as a result of the delimitation of community units. Under another arrangement calling for the granting of a bonus to farmers for each tree planted or each existing tree preserved, it has been possible to achieve favourable results in programmes for the improvement of fallow land.

40. It sometimes even happens that tribes recognize the indirect benefits of the forest as, for instance, the relationship between wooded areas and water supplies. Thus, in Kenya in 1955 the forestry department found itself in a situation where it was unable to comply quickly enough with requests for reforestation put forward by the African District Councils.

41. The difficulty of recruiting sufficient trained manpower has been further complicated by the higher volume of investment and the increase in forest production and in the number of forest-products industries.

42. Of particular interest in this regard are the efforts that have been made by the forestry authorities in Kenya to build up a permanent labour force living in the heart of the forest. A portion of the logging revenue is collected by the African Trust Fund and is used for improving social conditions in remote forest villages (schools, dispensaries, workshops, water supply, sports facilities, cinemas, women's activities). In 1952, 8,789 workers living in the forest were thus permanently employed in thinning, planting, maintenance work, etc.

VI. THE BROAD OBJECTIVES OF FOREST POLICY

43. Despite the various limiting factors just described, the favourable elements that have come to the fore since 1946 have been sufficiently dynamic to make the balance-sheet for the period positive.

44. The progress that has been achieved will be analysed successively in the light of the two essential objectives of every forest policy.

(a) Material objectives. These are concerned with safeguarding, restoring and, if necessary, establishing wherever natural conditions permit, a forest vegetation capable of fulfilling its rôle of protective ground cover, water reservoir and climate regulator. These objectives have been reflected in protection programmes.

(b) Social and economic objectives. The aim in this case is to meet more adequately the local demand for lumber and, in some cases, firewood and to provide an additional source of revenue from exports. These objectives have been reflected in programmes for the expansion and improvement of production, the aim of which is two-fold: on the one hand, the progressive establishment of a silviculture based on sustained yield and designed to make possible a steady, regular and expanding output; and, on the other hand, the artificial creation of additional resources, on a short-term or medium-term basis, on land not previously used for forest production.

45. The problems of production management have received unequal treatment according to the length of time the forestry services have been in existence and their degree of organization, but the protection of resources has continued to receive the greatest, and sometimes the entire, attention.

VII. PROGRESS ACHIEVED IN THE PROTECTION OF FOREST RESOURCES

46. Under this heading, the most characteristic trends of the period 1946-1956 can be analysed as follows.

Direct protection

47. Measures for the direct protection of woodlands and wooded areas is still the main concern, and tends to be concentrated on land under permanent forest. Generally speaking, the particular concern of regulation is to prescribe protective measures and to set felling limits as regards all or most of the forest resources of a Territory. Thus in French West Africa, supervision of the protected forest land applies not only to forests (restriction of rights in regard to use, clearing, cutting of branches and grazing) but also to single trees (the cutting of more than forty species being prohibited on all vacant and ownerless land). In the Belgian Congo, the 1949 regulations invest the civil authorities with power to prohibit or

regulate forest fellings wherever the sparseness, state of deterioration or the future usefulness of the forest stand calls for such action. The application of these measures is compulsory in respect of land with a slope exceeding 30 per cent.

48. Such regulations have appeared, however, to be somewhat unrealistic in the light of the inadequate means of supervision. No matter how strict the penalties may be - and some regulations have tried to make them even stricter - enforcement remains problematical if offences fail to be reported owing to lack of staff. Moreover, in several Territories, a long-term forecast shows that a large part of the forest area now under protection is inevitably bound to disappear. Madagascar, where in view of the small extent and great instability of the forests a set of very strict forest regulations was promulgated in 1930, is a very significant example in this respect. These regulations applied not only to forests but also to areas covered with fern or heath and to brushland and sparsely-wooded savanna. The result was that they were only compatible with intensive farming or efficiently managed grazing. After being in force for twenty years, this principle came under fire, and the Government was obliged to temper it by tolerating lax enforcement. The authorities were thus led to consider a change in policy whereby attention would be concentrated on delimited and classified forests and more flexible transitional provisions would be enacted even though the principle of prohibiting shifting cultivation was maintained. In some cases the regulations have even produced results contrary to the aim pursued. For example, at Kano, in Nigeria, a prohibition against cutting down trees on farms led the farmers to abandon certain useful practices, such as taking care of young trees or mingling the seed of useful trees with the seed used for sowing cereals.

49. Because of the questionable results of over-all protection owing to lack of sufficient staff, there has been a tendency to concentrate on the stands in the forest reserves while leaving to the indigenous authorities the responsibility for supervising all other forest resources.

50. The establishment of permanent forest areas has been given the most attention. These areas include the "protection reserves" the essential purpose of which is to safeguard the forest vegetation at all costs because of such serious physical necessities as erosion control, water supply and so on. This is the predominant objective of some Territories (e.g., Kenya, Hong Kong and Sierra Leone). These

areas also include the "production reserves", the purpose of which is to serve as a permanent supply of wood for future generations. These reserves, which are guarded against over-cutting, are destined to supply such needs when the resources of the protected forest have been exhausted. (In French West Africa, apart from some industrial logging, the protected forest has hitherto supplied all the wood required for the needs of the Territories in regard to firewood, sawn timber and lumber, and the greater part of the rough timber for export.)

51. The aim pursued is to enable the forestry services, working within firmly defined limits in the field, to establish a long-term silviculture, which alone is capable of bringing the permanent forests to such a level of productivity that they will meet all requirements in a few score years. A forecast made by the Research Institute of the Federation of Malaya has shown that in the next seventy years the output of the forest reserves should amount to almost eight times the output of 1955, if the timber needs of the larger population at that time are to be met.

52. Although the forest reserves have been very considerably expanded during the period under review, they are still, as a rule, quite inadequate in relation to future requirements and as a factor in the balance of nature. However, the work of classification and delimitation and, in some cases, of consolidation (by which it is possible to take into account property rights which were overlooked at the time of classification), and the upkeep of boundaries and the prevention of encroachments, are hampered by a shortage of staff. The following table gives examples of the size of forest reserves in relation to the total area of Territories characterized by different types of demographic and economic conditions.

Territory	Year of reference	Area in hectares of the forest reserves	Percentage of total area	Remarks
Federation of Malaya	1956	3,247,600	24.7	Of which only 16.1% are production reserves
British Honduras	1956	462,500	20.1	12.4% at end of 1955
French West Africa	1955	11,828,522	4.7	6,068,000 hectares in 1946
Madagascar	1956	2,160,900	3.5	
Kenya	1955	1,398,000	2.45	

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53. Several reports have laid stress on the delimitation of the permanent forest reserves. In Madagascar, delimitation has been initiated and is being carried out at a brisk rate. In the Belgian Congo, the application of the new regulations of 1949 has led to a review of the forest reserves set aside since 1906, in some of which only wood cutting was restricted, whereas in others all kinds of flora were protected. From now on, only completely delimited forest stands where all customary rights incompatible with the aim pursued by classification have been suspended will be treated as forest reserves. Although in British Guiana the demarcation and registration of the forest reserves had, in 1950 been considered superfluous on account of the size of the forests and the small demands made upon them, the need to establish properly delimited permanent forest reserves was recognized in 1953 by the setting-aside of the Crown Forest.

54. As encroachments are still numerous in areas with a high density of population, there is general agreement that the regular upkeep and, where necessary, the re-establishment of the boundary lanes is important. This work has been facilitated since 1946 by the use of tractors and special mechanical devices (clearing-dozers, etc.).

55. The problem of customary rights in permanent forest reserves is a matter that has been carefully studied in several Territories. It has generally been recognized that, apart from cases where such rights could be permanently commuted, the preferable course was to allow them to be exercised so far as compatible with forest improvement.

Protection against fire

56. In the forest reserves as a whole very great efforts have been devoted to protection against fire. In this connexion, several ideas that will serve as a basis for future action were either brought to light or were confirmed during the period under review.

57. Brush fires in areas that have been over-cropped by the indigenous farmer are a formidable enemy of the tropical forest. They prevent the forest litter from restoring the fertility of the soil and extend and perpetuate the conversion into savanna regions of vast regions of climax forest.

58. Laws to prohibit brush fires have been of no avail in preventing this destructive practice. There is even some doubt whether the law, by taking the

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place of the customary regulations authorizing brush fires but subjecting the practice to strict rules, does not thwart the aim pursued. Consequently, the need for active methods of fire prevention is now recognized by all.

59. While the specialists, for the most part, admit the technical superiority of total protection, there is a growing tendency to confine this practice to large stands where, the risks being limited, an exorbitant investment is not required, or to stands whose economic value justifies the high cost of total protection. There is no denying that, despite the use of mechanical devices, the process of establishing and maintaining firebreaks and fire lanes, constructing observation towers and establishing alarm systems is expensive. Moreover, the big fires that broke out in British Honduras in 1955 showed that fire-protection measures should be constantly strengthened (wider firebreaks, ploughed strips alongside roads, partitioning of stands, road network facilitating rapid access for fire crews, etc.).

60. Moreover, some specialists are of the opinion that total protection involves long-term risks that become increasingly grave the longer such protection is continued. Since, as may be assumed, the forestry services do not have the means for carrying out maintenance and supervision to the required extent, it sometimes happens, when the totally-protected forest area is too large, that a sudden outbreak of fire at the end of the dry season causes disastrous damage. The undergrowth that has been built up as a result of the protective measures enables the fire to reach the crowns of the medium-sized trees, and thus the benefits produced by several years of expensive and difficult protection is lost in a single day.

61. There seems, in short, to be a trend towards a policy of total protection solely for limited areas, and in particular for artificial stands, while allowing the remaining forest reserves to be safeguarded by the practice of controlled early burning.

62. Observations of the effects of early burning carried out at the beginning of the dry season when the forest vegetation, still having a high water-content, is unlikely to suffer serious harm have elicited wide support for extending this practice. Systematic experiments are now being made in the Belgian Congo (Katanga), Nyasaland and elsewhere with a view to providing comparative data on the consequences of total protection, early burning and late burning.

63. Early burning, by keeping the forest clean and making late-season brush fires unlikely, helps to lessen serious dangers. The soil is not liable to rapid deterioration as the stubble is not completely burned. In open forests and in savannas, early burning favours the development of certain offshoots and seedlings and thus starts the biological process tending towards the restoration of the climax forest. In some Territories, however, e.g. Kenya, early burning is said to impair the water-storage properties of the forest, to prevent the regeneration of certain useful species and to lead to the destruction of humus. Among other objections to early burning is the difficulty of determining the precise date that is most suitable for the operation so that the grass burns just enough to prevent a second burning at the end of the dry season that would be fatal to early young seedlings. Long-term experimentation is required in order to determine the various types of vegetation that spring up after burning.

64. A procedure, which will be described below, that seems to hold some promise for reducing the dangers arising from brush fires is the controlled clearing carried out in French West Africa.

65. The problem of grazing in forests and in Sahel-type areas has been given attention in several Territories where there has been a considerable increase in livestock. The great shortage of personnel prevents effective control over migratory grazing, the movement of herds from one area to another and the tendency towards excessive concentration in the vicinity of water holes, which are insufficient in number. Efforts have been made, especially in the Sahel-type areas, to devise a more effective procedure for the management of extensive grazing, including the provision of a larger number of water points, the prohibition of grazing in certain areas, and the introduction of rotation grazing. In some cases this has led to the establishment of vast forest-pasture reserves. Thus, in the vicinity of the wells drilled at Ferlo in Senegal, a reserved area of 800,000 hectares was set up in order to prevent the increase in livestock encouraged by the large-scale irrigation works from upsetting the balance of nature and leading to a process of desert encroachment.

Indirect protection

66. While the main attention has been given to direct protection, various types of action relating to agriculture and grazing have also been undertaken to protect

the forests by indirect means from the pressures exerted by the rural populations. These activities can be analysed as follows:

67. Activities aimed at rationalizing agricultural and grazing practices in ways that will make them less detrimental to forest resources. The following are worth mentioning:

(a) The "indigenous farmer community" (paysannats indigènes) system. The aim of the paysannats , as established in the Belgian Congo, is to "replace extensive farming, which leads - in some cases irreparably - to the destruction of natural resources, by a farming system that will become more and more intensive while at the same time ensuring the permanent productivity of the soil". This is, in a way, an improvement on the traditional method of shifting cultivation. In the Belgian Congo, the ten-year plan for 1950-1959 provides for the settlement of 450,000 farmers in areas of the forest (corridor system) and of the savanna (strip cropping). Each holding comprises as many breaks as there are years of fallow-crop rotation, namely, from fourteen to twenty; (by the end of 1954, 135,087 holdings out of the 502,000 to be assigned had been occupied). In the regions where there is no longer enough good forest land for parcelling out, plots of savanna are set aside for natural reforestation. These areas are surrounded by wooded strips from thirty to fifty metres wide running parallel to a ten-metre firebreak that is carefully maintained. A programme calling for the establishment of 5,000 hectares of protective wooded strips each year has been entrusted to the forestry service so that in ten years an area of 500,000 hectares of forest fallow will be restored on which it will be possible to settle 60,000 farmers.

(b) The controlled-clearing system, used particularly in French West Africa (Fouta Djalon). Once brush fires have been prohibited, the next step is to carry out felling and clearing, to cut the vegetation level with the ground and to put the debris into heaps which are then destroyed, by means of a smouldering fire, as soon as the first high winds heralding the rainy season spring up. This practice makes the soil richer in humus and benefits the forest vegetation.

(c) The extension of forest fallow, especially on slopes (French West Africa, Belgian Congo).

68. Intensification of crop-growing and stock-raising, for example:

(a) Pasture improvement through tilling the land, sowing seed and distributing cuttings of forage crops, special attention being given to the problem of supplying fodder during the dry season.

(b) The development of mixed farming in the British Territories, under a system in which livestock are incorporated into the farm in order to provide the cultivated land with manure.

69. Creation of new agricultural resources less harmful to forest vegetation, which, besides giving the farmer a better return, can be produced on land other than forest or on smaller forest areas. Of particular interest are the development of rice crops in low and humid zones (for example, French West Africa, Sierra Leone, Madagascar); the systematic cultivation of certain tree crops (for example, oil palm), which are of advantage in so far as they enable the farmer to reduce the area under extensive cultivation; the encouragement of fish-farming, etc.

70. Creation of additional wood resources, outside the forest, to meet the immediate requirements of the population, either by improving fallow or by planting exotic conifers or trees for fuelwood (see below).

VIII. PROGRESS ACHIEVED IN PRODUCTION

71. Considerable research and experimentation were carried out during the period under review with the aim of establishing a more intensive type of silviculture in the permanent forest reserves. Some useful information has thus been assembled, but the practical achievements are still on a very small scale compared with the size of the forests concerned. In 1956, in the Federation of Malaya, silvicultural practices had been introduced in only 0.7 per cent of the productive reserves and had been completed in only 1.2 per cent of the same area. These figures, moreover, are among the highest for any Territory.

72. Methods of operation are, in addition, poorly organized, owing not only to technical difficulties but also to the lack of clearly-defined economic objectives. This will be the case as long as the undermanned forestry services must concentrate on protection problems and until such time as the biological characteristics and the practical possibilities of the various forest species have been clarified by further research.

73. The progress that has been made can be classified under the following three headings:

Greater efficiency in forest management

74. The management of stands for the production of fuelwood has been carried out systematically in densely populated areas. In some Territories an effort has been made, on the basis of an inventory of the utilizable forest reserves and the number of years still remaining before the first managed cuttings are begun in those reserves, to determine the annual allowable cut. In the Belgian Congo, a management programme under which 5,000 hectares of forest would be brought under management each year has been adopted with a view to trebling the wood production of the Territory.

75. Also in the Belgian Congo, various measures have been taken to encourage the more intensive utilization of concessionary forests. These include the abolition of licences for the purchase of timber from the indigenous inhabitants, restriction of permits to undertakings possessing sufficient equipment for efficient logging, obligation on permit holders to utilize all marketable species, preferential treatment for well-equipped industrial undertakings, reduction of taxes on second-grade woods and the introduction of bonuses for the export of such woods.

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76. Generally speaking, the depletion of the traditional valuable species and the increased local demand for lumber and building timber have led to a more complete utilization of resources.

77. Natural regeneration methods, however attractive they may be for the silviculturist, are still impracticable in tropical forests. Nevertheless, some interesting results have been reported, but these need further careful study before being widely disseminated. In general, the following aspects of this matter are of particular significance at the present time:

(a) The need for preliminary surveys of seed-trees and of seedlings already growing.

(b) The progress achieved in the destruction of plants hindering natural regeneration. In this connexion experiments have shown the usefulness of sodium arsenite, "ammate", and plant-hormone preparations such as 2.4-D and 2.4.5-T mixed with diesel oil.

(c) The need for careful treatment of the ground cover over a period of years in order to ensure proper conditions for the growth of young plants of the valuable species.

Methods of rearing or converting natural stands

78. These methods have been given a broader application, and the results have been generally more encouraging than in the case of natural regeneration. The techniques that have been tried relate either to selection operations or to artificial improvement.

(a) The selection operations consist in promoting the development of intermediate trees of the more valuable species that are present in a stand in sufficient numbers by the energetic cutting-away of lianas, climbing plants, unmarketable wood, etc. Operations for stand improvement (French West Africa, French Equatorial Africa) and those referred to as "uniformization from the top" (Belgian Congo) come under this heading.

(b) Artificial improvement consists in the replacement, throughout all or part of the area being treated, of the natural forest stands of varying economic value with artificial stands consisting exclusively of valuable species. The work that has been done has shown:

(c) The technical advantages of the "close planting" method, the cost of which, however, is high (200 man-days per hectare on the Ivory Coast);

(d) The success of plantations laid out with cross-rides, the cost of which is not so high (50 man-days per hectare), but which have to be carefully tended. The already existing stands favour the self-pruning of the trees that are introduced, but the method is only suited to certain species and in no case to light-demanding species such as the okoumé;

(e) The satisfactory results of planting on crop-land (Taungya system) when the soil in question is sufficiently fertile not to be depleted by the agricultural crop. This method, despite its advantages from the crop-growing standpoint, was unfortunately very little used during the ten-year period, owing to the difficulty of recruiting volunteers from among the local population and, in some cases, of securing the timely departure of the cultivators settled in the forest.

(f) Experiments were also undertaken, especially in Gabun, with sowing or planting on burnt slash.

79. It is generally recognized that improvement methods are mainly applicable to open forests, which alone are suitable for the introduction of the more valuable species in the lower storey.

80. During the period under review, programmes of artificial restocking were put into effect in the various Territories, and particularly in the Territories with the least natural resources (for example, Kenya: 48,900 hectares planted by the end of 1954, including 2,910 in 1954; Madagascar: 4,108 hectares in 1956, plus approximately 4,000 hectares planted by the indigenous inhabitants, especially during Arbor Weeks). These programmes have a dual objective - the one physical, viz., afforestation for purposes of soil conservation and restoration; and the othe economic, viz., afforestation to meet the requirements of the Territories for softwoods and fuelwood.

81. The most utilized species were: exotic conifers (Pinus patula, P. Caribaea, P. radiata, P. Kashya; Cupressus lusitanica, etc.); eucalypti; and certain hardwoods, such as teak, grevillea for lumber, cassia and filao for fuelwood.

82. Several Territories attached primary importance to the development of nurseries (Kenya: fifty nurseries which in 1954 supplied 12 million plants). Experiments with plants in cups or tubes of polyethylene were also carried out.

83. These various projects demonstrated the importance of carefully preparing the soil, an operation that was facilitated by the use of mechanical devices and ranged from simple scalping by means of a rotavator to total and permanent destruction of the competing weeds.

84. Also, the research that was undertaken showed the advantage of using very strong young plants raised for a sufficient length of time in nurseries (four years for the iroko in Nigeria). The pruning of young groves was carried out in some Territories (Kenya, Southern Rhodesia, etc.). As the result of some serious setbacks it became apparent that not all types of soil were amenable to reforestation and that only by very careful maintenance could the success of an investment be assured.

85. On rugged savanna, experiments were conducted with a method of progressive reforestation in which two wooded strips were established, one close to the line of the ridge and the other at the bottom of the slope, the object being that the intervening area would revert to forest by natural means. Mention should be made of experiments in the direct seeding of pines on savanna land, with a view to improving the methods of sowing and determining the quality of pre-treated seed (British Honduras).

IX. DEVELOPMENT OF PRODUCTION, PROCESSING AND EXPORTS

86. An analysis of the production statistics of the various Territories shows several extremely clear trends.

87. A considerable increase in total production. Whereas the output of fuelwood only increased locally, particularly for the production of charcoal, the output of timber and of industrial and building lumber rose to a remarkable degree, as is apparent from the following table relating to the eighteen Non-Self-Governing Territories that had the greatest output.

Index numbers for timber output[a/]

1947	1949	1951	1953	1955
100	126	161	185	239

a/ Alaska, Belgian Congo, British Guiana, British Honduras, British North Borneo, Federation of Malaya, French Equatorial Africa, French West Africa, Gold Coast, Kenya, Madagascar, Morocco, Nigeria, Northern Rhodesia, Sarawak, Sierra Leone, Trinidad and Tobago, and Uganda.

88. Nevertheless, production remains stationary in some Territories, either because the forest reserves, being in danger of depletion, are protected to the utmost, or because the forest development and utilization programmes have not yet reached the productive stage (Sierra Leone, Kenya, Rhodesia).

89. The increase has been particularly noteworthy in certain Territories under British administration, from where, since the war, the United Kingdom has endeavoured to derive the greater part of its imports of rough timber (Sarawak, North Borneo, Nigeria, Gold Coast) or sawn timber (Federation of Malaya, Gold Coast, Sarawak).

90. The number of species utilized has increased considerably in most of the Territories, and the ratio of "common woods" to "cabinet-making woods" has increased (in Madagascar, common woods represented 65 per cent of the total in 1956, as against 11 per cent in 1946).

91. Exports of rough timber increased in the main exporting countries, as is shown by the following table relating to the eight Territories that are the most important in this regard.

Index numbers for exports of rough timber[a/]

1947	1949	1951	1953	1955
100	168	222	305	471

a/ Belgian Congo, British Guiana, British Honduras, British North Borneo, French Equatorial Africa, French West Africa, Gold Coast and Sarawak.

92. The most characteristic feature of this period, however, has been the increase in the quantities consumed or processed locally in the various Territories (in 1955: 100 per cent in the case of lumber in the Federation of Malaya, a Territory whose output and exports of sawn timber have increased ninefold since 1947; 80 per cent in the Belgian Congo; 57 per cent in the Gold Coast; 43 per cent in French Equatorial Africa). The production of sawn timber reached very high levels in comparison with the preceding period, thanks to the installation of well-equipped, large-capacity sawmills. (In the Gold Coast, the African Timber and Plywood Company completed in 1952 the installation of a sawmill whose consumption will be about 3,000 tons of logs per week).

Index numbers for the output of sawn timber[a/]

1947	1949	1951	1953	1955
100	183	232	290	339

a/ Belgian Congo, British Guiana, British Honduras, British North Borneo, Brunei, Federation of Malaya, Fiji, French Equatorial Africa, French West Africa, Gold Coast, Kenya, Madagascar, Mauritius, Morocco, Nigeria, Sarawak, Sierra Leone, Trinidad and Tobago, and Uganda.

Index numbers for exports of sawn timber[a/]

1947	1949	1951	1953	1955
100	210	288	431	604

a/ Belgian Congo, British Guiana, British Honduras, British North Borneo, Federation of Malaya, French Equatorial Africa, Gold Coast, Kenya, Nigeria, Sarawak and Uganda.

93. Moreover, a start has been made in several Territories with the production of improved semi-finished products, particularly plywood, panels and wood wool.

Output of plywood[a/]

1947	1949	1951	1953	1955
		(million cubic metres)		
10	13.3	32.8	61.2	68.3

a/ In 1955: Belgian Congo, Federation of Malaya, French Equatorial Africa, French West Africa, Gold Coast, Morocco and Nigeria.

94. Pulp mills are still few in number, although a few pilot plants have been established (Alaska, French West Africa).

X. CONCLUSION

95. Judged rather by the new prospects that have opened up than by the measurable progress that has been achieved as a result of considerably improved facilities, the period 1946-1956 may well be the opening of a new era in forestry in so far as the Non-Self-Governing Territories are concerned. The achievements of these ten years should enable the authorities responsible for forest policy to arrive at a more accurate evaluation of the role of the forest, both in the development of the Territories and on the world market. There is, in particular, a dawning realization that the economic significance of the forest - especially in the tropical and equatorial zones - and the kind of forestry practices that will in consequence be called for may be entirely different from what they were up to 1946.

96. The speed with which efficient forestry practices designed to derive the maximum benefit from the resources of the forest can be introduced depends to a large extent on the development of research and industrialization during the next few years. The progress achieved in the past ten years will be consolidated only if the Territories are able in due time to secure the necessary assistance as regards both financial resources and especially qualified personnel. In order to enable them to obtain such personnel, it seems that priority should be given to the rapid training of competent technicians.
