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REQUIREMENTS AND POLICIES FOR TRAINED MANPOWER AT THE PROFESSIONAL AND TECHNICAL LEVELS FOR AGRICULTURAL DEVELOPMENT IN AFRICA SOUTH OF THE SAHARA, TO 1985

(Prepared and presented by FAO)

NOTE:

This paper is a draft chapter from the FAO Indicative Plan study for Africa south of the Sahara. The study in its present provisional presentation represents only a draft for discussion with the governments of the sub-region. It is for the purpose of allowing for the fullest possible discussion of the study that the paper is put before the second session of the ECA Working Party on Manpower and Training.

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REQUIREMENTS AND POLICIES FOR TRAINED MANPOWER
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Introduction

1. The importance of adequate supplies of trained manpower, both in terms of numbers and of quality, for agricultural development in Africa goes without saying. Yet it cannot be assumed that the necessary trained and experienced personnel will automatically be available when required. Steps to ensure the supply must be an integral part of every agricultural development plan.
2. There is evidence in many countries to show that the major contribution to agricultural development has come from the human skills and resources, and that "human capital formation" - from investment in agricultural education, research and training - can be no less important than other investments. This also will surely apply in Africa. There is a growing recognition in governments and elsewhere, of the overriding importance of the human factor in carrying out technical change and in achieving progress. Agricultural development in the broadest sense, calls for an approach to people which emphasizes education and training, demonstration and leadership, rather than the exercise of authority and the enforcement of regulations, although the latter have and will continue to have, a place.
3. This concept has especial validity when considering broad regional and national development plans. Unavoidably, these have to be expressed in terms of gross national product, in hectares, yields and units, but unless these are translated into human terms, into what they mean for the individual farmer or cultivator, and until they are understood, accepted and implemented by the farming and rural communities, the objectives are likely to remain paper ones, in every sense. This is of particular relevance where the large rural populations not only have a high illiteracy rate but are frequently sub-divided within themselves and from the government, by differences of language and custom.
4. Because the agricultural field services must, in future, be as much if not more concerned with people as with crops and hectares, the trained manpower requirements for agricultural development have been determined primarily on the basis of the agricultural population, as expressed in terms of farm families.^{1/} The use of the farm family as the planning unit ensures that, in time, an equitable service will be provided for all communities, although in the short term it will be essential to concentrate initial efforts in areas of highest potential.

^{1/} FAO: Agricultural Development in Nigeria, 1965-1980, Chapter XVIII.

5. Definition and scope: It seems appropriate at this point to state briefly the limitations of a study of this kind, covering so many countries and diverse conditions. First, the trained manpower requirements spoken of here are confined to the needs for agricultural development, of personnel at the professional and technical or intermediate levels only. The concept of manpower for the agricultural sector as a whole is not touched upon, nor is labour productivity at the farm level. The important question of training of farmers and agricultural workers is dealt with more fully elsewhere. Secondly, while a specific manpower pattern is used throughout the methodology for estimating requirements in the two main categories, it is not to be implied from this, that government services must necessarily be organized on this basis in any country. Such organizational matters are dealt with in the previous chapter.^{1/} The purpose here is to determine the order of magnitude of the possible demand in relation to the potential supply of trained personnel, and the implications of the resulting picture. Within these parameters, manpower problems have been looked at from four angles - numbers, quality, strategy and cost. These aspects are dealt with in that order in the following pages.

^{1/} This refers to another chapter of the Indicative Plan Study.

PART I : QUANTITATIVE ASSESSMENT OF TRAINED MANPOWER REQUIREMENTS

6. The difficulties of making accurate estimates of long-term manpower requirements are many, especially in the developing countries. Statistical data are lacking; methodologies applicable to agriculture are only now being evolved; facilities for collecting and analysing the requisite data are limited if not absent. Nevertheless, where manpower resources are so limited, there is an obvious need for guidance in establishing priorities and objectives.

7. Two approaches: In estimating quantitative needs, one must consider not only the requirements of the concentration programmes mentioned earlier, but also the provision and maintenance of less specifically orientated government services to agriculture as a whole, together with the needs of private enterprise and of commercial interests serving farmers. Two sets of estimates have, therefore, been prepared. The first covers the needs of what have been termed the general agricultural field services. This attempts to assess on a broad basis, the numbers needed to provide reasonable services to the whole country, whether a concentration of effort programme as such, is embarked upon or not.

8. The second set relates to the more specific needs of a full concentration of effort programme at the operational level. As such, it includes some groups of personnel (e.g., for co-operatives and home economics) not in the first set, but is less complete in total coverage. Apart from this, in terms of purely agricultural personnel, the second set represents only an intensification of services at the field level. Consequently, the numbers required are not wholly additional to the first set, although, as will be seen later, some increase is entailed in many instances. As is explained more fully in the preceeding chapter, the Concentration of Effort Programme¹ would gradually incorporate and eventually replace the general agricultural services. This entails more a re-deployment of available manpower and certainly not a duplication of services. A comparison of the two estimates is made at the end of this section (see paragraphs 26-28).

Method of estimating numbers required

(a) General agricultural field services - public and private sectors

9. An average size of farm family for each country was determined either directly, or by relating the estimated number of farm families or farms, to the estimated total agricultural population. Wherever possible, the figure used for each country has been based on actual research or demographic

studies. This may not always correspond to the family size implied in national development plan assumptions. For Tanzania, for example, a figure of 6 persons per farm family was used, instead of 5. For Gambia and Ghana, published data on this point could not be found and a family size of 6 was assumed for each, based on those for neighbouring countries.^{1/}

10. It must be appreciated that these are broad averages which may conceal wide variations from tribe to tribe and district to district within a country. For example, published data for Dahomey give district averages ranging from 5.5 to 12.5 persons per household.^{2/} Obviously these variations must be taken into account by local planning authorities in planning individual project areas.

11. A further aspect is the extent to which family groups may operate one farming unit; for example, the "concession" in many of the French-speaking countries; the "extended family" as known to the sociologist. In Dahomey, for example, "concessions" in the North average 2.1 households and 10 persons per concession, and in the South, 3.2 households and 13 persons.^{3/}

12. The existence of such multiple units simplifies the field work of extension services, for example, as it reduces the number of "decision-makers" whom they have to contact. However, the evidence of demographic and other studies indicates that most of these traditional systems are declining and that the trend is towards the individual holding, operated typically by a farmer, his wife (or wives) and their children. Accordingly, in the expectation that this trend will continue to accelerate with development, the trained manpower requirements have been based on the estimated numbers of individual farm families. This is not to deny that in many countries, given suitable encouragement, modern co-operative group farming systems will develop. Such developments, however, do not affect the basis of estimation put forward here.

^{1/} The importance of the assumption on average size of family in this calculation must be emphasized. If, for example, a figure of 5 is used instead of say, 7, the ultimate effect is to increase the total staff requirements by almost 40 per cent. This underlines the need for having accurate rural population census data.

^{2/} Côte-d'Ivoire 1965 - Population; Ministère du Plan, Abidjan, 1967.

^{3/} Données de Base sur la Situation Démographique au Dahomey en 1961, INSEE, Paris, 1962.

13. For the forward projections of farm family numbers, it has been assumed that the average farm family size will remain constant. The data on agricultural families are presented in Table 1. These data further emphasize the point made earlier that, in spite of the influences of urbanization and industrialization, a major increase in agricultural population numbers is to be expected for many years to come. For the countries given, the total estimated increase from 1962 to 1985 amounts to some 52 per cent. (Central Africa 29 per cent; East Africa 45 per cent; West Africa 66 per cent).

14. Ratios used: In the present state of our knowledge, there is no acceptable alternative to using certain empirical ratios of field personnel to farm families, and of senior to junior staff, as a basis for estimating requirements. It is considered by FAO that for agricultural extension work in most of the developing countries of Africa, a general objective of one full-time field-level extension worker per 1,000 farm families, is a practicable one giving reasonable coverage and within most countries' resources. At the same time, in rural areas with comparatively high population densities and where intensive forms of agriculture are practised, for example on irrigated land, the need and scope for agricultural services rises considerably. In these areas, a ratio of one field-level extension worker to 500 farm families may be a more appropriate objective. Some African countries have, in fact, set themselves targets of this order. In the absence of more specific data, it is assumed here that a high rural population density (as defined later) is synonymous with an intensive agriculture. For simplicity, it is also assumed that the rate at which these areas might be staffed at the higher level, would be the same as that outlined below for the concentration of effort projects, namely, all of them covered by 1985, but only a small number by 1975.

15. The method of determining the proportion of high density areas, and the numbers of agricultural families in them, is discussed later. Meantime, it can be stated that by using these two target ratios as the basis, together with some further adjustments outlined below, an estimate can be made of the approximate total volume of trained personnel likely to be required. From this, in turn, can be determined the annual inputs and outputs required to reach the manpower targets, and embodying some flexibility to cope with reasonable fluctuations in demand.

16. Non-extension services: It is considered, on the limited evidence available, that for the general service requirements, the trained personnel needs of essential supporting farm services (i.e., non-extension government services) might amount to some 40 per cent of the extension services' requirements by 1975, increasing to 60 per cent by 1985. These may be conservative figures and not enough for those countries which, on the standard adopted, have few or no high density areas but which adopt a full concentration of effort programme. This point is returned to later.

Table 1 : Africa south of the Sahara: Agricultural population, family size and estimated numbers

Country	Agricultural population 1/			Average number of persons per farm family	Estimated number of farm families		
	1962	1975	1985		1962	1975	1985
	('000)				('000)		
West Africa							
Dahomey	1870	2351	2884	4.5 2/	416	522	641
Gambia	270	338	391	6.0 3/	45	56	65
Ghana	4430	5804	7195	6.0 4/	738	967	1200
Ivory Coast	2935	3804	4465	6.5 5/	452	585	687
Mali	3875	4903	6212	4.5 6/	861	1090	1380
Mauritania	775	985	1198	4.5 7/	172	219	266
Niger	2841	3765	4813	4.1 8/	693	918	1174
Nigeria	42811	58449	73070	5.2 9/	8170	11154	13944
Senegal	2470	2965	3535	6.0 10/	412	494	589
Togo	1220	1556	1993	6.3 11/	194	247	316
Upper Volta	4005	5004	6090	6.7 12/	598	747	909
Central Africa							
Cameroon	4178	4882	5661	5.0 13/	835	976	1132
Central African Republic	1088	1186	1269	4.0 14/	272	296	317
Chad	3035	3673	4320	4.6 15/	660	798	939
Congo (Brazzaville)	536	582	635	4.7 16/	114	124	135
Congo (Kinshasa)	10655	11963	13361	4.5 17/	2368	2658	2969
Gabon	385	385	385	4.6 18/	84	84	84
East Africa							
Ethiopia	19350	22836	26015	6 19/	3225	3806	4335
Kenya	7305	9868	12411	6 20/	1218	1644	2068
Madagascar	4895	5958	6682	4.7 21/	1042	1268	1422
Malawi	2990	3971	4946	5 22/	598	794	989
Tanzania	9431	12161	14710	6 23/	1572	2027	2452
Uganda	6455	8048	9434	5 24/	1291	1609	1887
Zambia	2820	3626	4385	7 25/	403	518	626

Footnotes to Table 1

Sources:

- 1/ FAO/IWP population estimates and projections, August 1967 (in thousands).
- 2/ Enquête Démographique au Dahomey 1961, INSEE Paris, 1964.
- 3/ Assumed figure.
- 4/ Assumed figure.
- 5/ Local sources.
- 6/ Enquête Agricole au Mali 1960, INSEE Paris, 1964.
- 7/ République Islamique de Mauritanie, Bull. Stat. et Econ., no. 3, 1964.

17. Provision for private sector: Turning to the probable needs of the commercial or private sector in agriculture, it can be expected that in an expanding economy there will be a rapid growth of this sector and in the technical services it will provide for the farming community. While the main load of development will continue to fall on government agricultural services for some time to come, provision should be made for private and commercial requirements. This has been done, again in an empirical way, by adding 10 per cent of extension field services' needs, to the overall total in 1975, increasing to 20 per cent in 1985. In several African countries, some trained agricultural personnel are already employed in the private sector; in individual countries the provision for this category may need to be raised.

18. Senior personnel: For senior supervisory and specialist personnel, a useful indication for broad planning purposes is given by using a ratio of 1 senior to 5 field-level staff. This allows, very approximately, for half of the senior category being earmarked for supervisory duties (i.e., at a ratio of 1:10 field staff); the other half being headquarters directorate and subject-matter specialist staff. The overall ratio of 1 to 5 has been applied uniformly to all services. The training levels of the major personnel categories, and their interchangeability, are discussed later.

Footnotes to Table 1 (cont'd)

- | | |
|--|--|
| 8/ Etude Démographique du Niger, 2 ^e Fascicule, Données individ. INSEE Paris, 1963. | 17/ Demographic Yearbook of United Nations, 1965. |
| 9/ <u>Rural Economic Survey of Nigeria</u> 1963/64, 1964/65, Lagos, 1966. | 18/ Recensement et Enquête démographique 1960-1961, Ensemble du Gabon, Résultats Définitifs, INSEE Paris. |
| 10/ Enquête Agricole au Sénégal 1960/61, Résultats Provisoires, INSEE Paris. | 19/ <u>Agricultural Education and Training in Ethiopia</u> , FAO, Rome, 1967. |
| 11/ <u>Demographic Yearbook 1965</u> , United Nations. | 20/ <u>Republic of Kenya Development Plan</u> , 1966/70 (Chapter 6). |
| 12/ La Situation Démographique en Haute-Volta, Enquête 1960/61, INSEE Paris. | 21/ From national sources. |
| 13/ Local sources. | 22/ <u>Report on Agricultural Staffing and Education Requirements in Malawi, 1966-1974</u> , IBRD/ADS, 1966. |
| 14/ Enquête Agricole en République Centrafricaine 1960/61, INSEE Paris, 1965. | 23/ From national sources. |
| 15/ Enquête Démographique au Tchad 1964, INSEE Paris. | 24/ <u>Uganda's Second 5-year Plan</u> , 1966/71. |
| 16/ Enquête Démographique 1960/61, République du Congo, INSEE Paris. | 25/ From national sources. |

Table relates to text, paragraph 9 et seq.

19. The country by country estimations made on the basis outlined from paragraph 14 onwards are given in Appendix Table A/1. This Table does not include the considerable number of trained personnel required for the multi-purpose co-operative societies expected to develop in the focal zones. These and certain other more specialized services are dealt with separately later. It has to be stressed also that the estimations are based on the requirements of a fully integrated and streamlined Ministry of Agriculture, or its equivalent, covering all aspects of crop and livestock production and marketing, and geared to the needs of agricultural development as a whole. They are not based on the requirements of "fragmented" agricultural administrations spread over a number of ministries, official and semi-official bodies, which may frequently overlap and compete for scarce resources.

(b) "Concentration of effort" project requirements

20. Phasing: In estimating trained manpower needs for the concentration of effort project areas, two assumptions are made: (i) that all projects would be started by 1985; (ii) assuming a positive beginning in each country by 1970, to allow time to train and establish the initial project teams, it has been taken that, with the exceptions noted below, not more than 10 project areas would be established in each country by 1975, and the remainder by 1985. Whether these assumptions are, in fact, possible in terms of available staff, is examined later. The exceptions referred to above are Kenya, where the considerable progress made with a somewhat comparable approach could justify an initial target of 20 project areas; Nigeria, where, in relation to their size and past experience, the country could be expected to support a programme of 40 project areas by 1975; in the case of Gambia, it would seem that in relation to its total requirements, an initial 3 project areas would be adequate.

21. Project types: Preliminary to determining the more intensive staffing needs of the integrated package projects in each country, it would be helpful to know the approximate size, in terms of numbers of agricultural families, of a typical homogeneous area which would constitute a project. Lacking this information for any country, however, assumptions have had to be made, purely to illustrate the planning technique to be followed and to give some indication of the types and numbers of trained personnel required, both on a project and on a national basis.

22. For this purpose it has been assumed that project areas would be of two main types: (i) a "high farm population density" project area, containing about 6,000 farm families; and (ii) a "medium/low farm population density" project area, with rarely more than some 3,000 farm families. The former type would embrace, for example, densely settled areas with a more or less intensive crop production on very small holdings, such as characterized in East Africa, the Central and Southern regions of Malawi, the Central and Nyanza provinces of Kenya, and parts of Tanzania and Uganda bordering on Lake Victoria Nyanza; it would also be representative

of much of the coastal countries of West Africa. The second type of area would cover not only the more scattered and larger types of individual farms and tribal lands, but also the predominantly livestock-owning nomadic or semi-nomadic peoples, typical of the savannah country found over large areas of East, Central and West Africa.

23. Type (ii) is not necessarily of any lower priority than type (i). The needs of the people are certainly no less, but where resources of personnel and finance are limited, hard decisions have to be taken. Much will depend, for example, on the importance of cattle production in the economy of the country, now and in the future. The principles of dealing with the two areas are the same but the approach to each would be quite different. This, in turn, would be reflected in the composition of the respective teams to man them and in the training of the staff involved.

24. Numbers of projects: The difficulty is to determine, even approximately, how many projects of each type there might be in a country. This can only be decided by each country in the light of local experience and many other factors. Some quite different criteria may well be considered to be more appropriate than those which follow. For the purpose of this study however, it has been assumed that all rural areas with a population density of 74/75 and over per square mile (equivalent to 28/30 per km²) at the time of the last available census, would be in type (i) projects. The rest would be in type (ii). The proportions of the population so determined, were then applied to the estimated numbers of agricultural families in 1975 and 1985. From these, the number of projects of each type was estimated. The results of these calculations are shown in Table 2.

Table 2 : Africa south of the Sahara: High population density coverages and number of project areas, 1985

Country		High density area coverage 1/			Number of project areas 1985 ^{3/}		
		Land %	Population %	Number of farm families 2/ '000	type (i)	type (ii)	Total
West Africa:							
Dahomey	4/	16	59	378	63	88	151
Gambia	5/	44	56	36	6	10	16
Ghana	6/	31	56	672	112	176	288
Ivory Coast	7/	3	10	69	12	206	218
Mali	8/	-	-	-	-	460	460
Mauritania	9/	-	-	-	-	89	89
Niger	10/	-	-	-	-	391	391
Nigeria	11/	71	89	12410	2068	511	2579
Senegal	12/	16	37	218	36	124	160
Togo	13/	30	62	196	33	40	73
Upper Volta	14/	26	54	491	82	139	221
Central Africa:							
Cameroon	15/	9	52	589	98	181	279
Central African Republic	16/	-	-	-	-	106	106
Chad	17/	-	-	-	-	313	313
Congo (Brazzaville)	18/	-	-	-	-	45	45
Congo (Kinshasa)	19/	1.6	12	356	59	871	930
Gabon	20/	-	-	-	-	28	28
East Africa:							
Ethiopia	21/	21	43	1864	311	824	1135
Kenya	22/	9	62	1282	214	262	476
Madagascar	23/	7	29	412	69	337	406
Malawi	24/	59	83	821	137	56	193
Tanzania	22/	5	24	588	98	621	719
Uganda	22/	35	63	1189	198	233	431
Zambia	25/	-	-	-	-	209	209

Footnotes for Table 2

- 1/ Rural areas having 74/75 people per square mile (28/30 per km²) and above.
 2/ Proportion of 1985 totals (see Table 1).
 3/ As defined in text, paragraph 19 et seq.

Sources of population density data, etc:

- 4/ Enquête Démographique au Dahomey, 1961; INSEE, Paris, 1964.
 5/ Report of the Census of Population of the Gambia, 1963.
 6/ Statistical Yearbook, Ghana, 1961.
 7/ Inventaire économique de la Côte-d'Ivoire (1942-1956).

Table 3 : Africa south of the Sahara: Trained personnel required per project area

Project types	Services	Agric.	Extn.	Service	Farm	Co-op	
		Agric.	Home	Youth	ser-	socs.	Total
		Econ.	Econ.	work	vices	staff	
(i) <u>High farm population density:</u>					3/	4/	
Field-level staff	12 ^{1/}	2	1	5	22 ^{5/}		42
Senior/specialist	2	1	-	2	1		6
Totals:	14	3	1	7	23		48
(ii) <u>Medium/low farm population density:</u>							
Field-level staff	3 ^{2/}	1	1	3	10		18
Senior/specialist	1	1	-	1	1		4
Totals:	4	2	1	4	11		22

- 1/ Ratio of 1:500 for 6,000 farm families.
 2/ Ratio of 1:1,000 for 3,000 farm families.
 3/ Covers all "non-extension" services, e.g., land use, soil conservation, agricultural survey, range management, animal health, farm supplies.

- 4/ Assumed that by 1985 not all project area co-operatives will be developed to the extent of requiring the maximum of one field-level worker per 300 families.
 5/ Approximately one-fifth of these would be at the supervisory level. Table relates to text, paragraph 25.

Footnotes for Table 2 (cont'd)

- 8/ Annuaire Statistique, Mali, 1963.
 9/ Bulletin Statistique et Economique, no.4.5, Mauritanie, 1965 (p.55).
 10/ Etude démographique du Niger 1960; INSEE, Paris 1963.
 11/ Annual Abstract of Statistics, Nigeria, 1964.
 12/ Situation économique du Sénégal, 1962 (Table 1, p.11).
 13/ Inventaire économique du Togo, 1962-63 (Table III, p.20), 1964.
 14/ La Situation Démographique en Haute Volta, Enquête 1960-61; INSEE, Paris.
 15/ Economie et Plan de Développement, Rép.Fed. du Cameroun, 1965.
 16/ Economie et Plan de Développement de la République Centrafricaine, 1963.
 17/ Enquête démographique au Tchad. Paris 1966.
 18/ Données fondamentales sur l'économie du Congo (Brazzaville) (no date).
 19/ Rapport sur l'administration du Congo-Belge, 1958.
 20/ Economie et Plan de Développement du Gabon, 1962.
 21/ Ethiopia Statistical Abstract, 1965, Tables A.1 and A.3.
 22/ East African Royal Commission Report, 1953-55, Appendix VII.
 23/ Inventaire Socio-économique de Madagascar, 1960-65, pp. 44-47.
 24/ Economic Report, 1966, Appendix I, Table III.
 25/ Second Report of the May/June, 1963, Census of Africans, 1964.
 Table relates to text, paragraphs 21 et seq.

25. Project staffing: The staff needed for the two types of project area is expected to be of the order shown in Table 3. Using this basis and the possible number of project areas (Table 2), total staff needs for the concentration of effort projects have been calculated for each country. This information is presented in Appendix Table A/2. To simplify the calculation, it has been assumed that, up to 1975, all projects begun would be type (i) (i.e., intensive areas) except in Kenya, where half are assumed to be type (ii).

Comparison and implications of the two requirement estimates

26. The two sets of manpower requirements for 1985, for the more purely agricultural services, i.e., excluding the home economics and co-operative societies personnel, can now be compared. For ease of reference, the appropriate totals from Appendix Tables A/1 and A/2 are brought together in Table 4. This shows that for several countries, notably Ivory Coast, Mali, Mauritania and Niger in West Africa; all countries of Central Africa apart from Cameroon; for Zambia, and to a lesser extent, Madagascar and Tanzania in East Africa, the total requirements (column 4) for the concentration of effort projects are considerably higher than the corresponding totals (column 7) for the general agricultural field services. For most of the above countries, they are roughly one-third greater, while for senior staff (columns 2 and 5) the requirements are almost double.

27. This arises from two facts; (i) these countries have either no or very few areas of high agricultural population density, in the terms defined earlier (see Table 2), and (ii) the relatively more intensive staffing of the project areas, even in the medium/low density category. Point (ii) applies particularly to senior personnel, where, to ensure adequate supervision at the project level, the ratio of senior to field personnel is narrower (range 1:3.5 - 4.4, average 1:4.0) than that used in computing the general services requirements (1:5.0). In practice, it may prove possible to use wider ratios, although this will depend on the numbers, quality and experience of all personnel employed on agricultural development programmes.

28. It is emphasized again, that on the quantitative side of this type of long-term manpower planning, we cannot hope to do much more than indicate orders of magnitude of the numbers and levels of trained personnel likely to be needed and on which to base the annual intake/output requirements for the agricultural education system. For the countries referred to above, therefore, the two sets of requirements could be regarded as being the upper and lower orders. Provided some degree of flexibility is built into their agricultural education systems, adjusting upwards or downwards within such a range should not present serious problems. In the short term of course, more accurate and detailed forecasts are possible, once certain key policy decisions have been taken at government level. The implications of the long-term requirements in terms of annual outputs from the training institutions, are considered in a later section.

Table 4 : Africa south of the Sahara: Comparison of estimated total requirements of agricultural personnel at 1985

Sub-region; country	Total COE* project requirements 1/			Total general agric. services requirement 2/		
	Senior	Field	Total	Senior	Field	Total
1	2	3	4	5	6	7
West Africa:						
Dahomey	428	1750	2178	367	1834	2201
Gambia	44	178	222	36	182	218
Ghana	800	3248	4048	674	3369	4043
Ivory Coast	460	1658	2118	272	1361	1633
Mali	920	3220	4140	497	2484	2981
Mauritania	178	623	801	96	479	575
Niger	702	2737	3519	423	2113	2536
Nigeria	9294	40801	50095	9487	47437	56924
Senegal	392	1516	1908	290	1452	1742
Togo	212	874	1086	154	771	925
Upper Volta	606	2449	3055	504	2520	3024
Central Africa:						
Cameroon	754	3031	3785	620	3098	3718
Central African Republic	212	742	954	114	570	684
Chad	626	2191	2817	339	1690	2029
Congo (Brazzaville)	90	315	405	48	243	291
Congo (Kinshasa)	1978	7159	9137	1197	5985	7182
Gabon	56	196	252	30	151	181
East Africa:						
Ethiopia	2892	11366	14258	2232	11158	13390
Kenya	1380	5686	7066	1206	6030	7236
Madagascar	950	3601	4551	660	3301	3961
Malawi	660	2858	3518	652	3258	3910
Tanzania	1634	6111	7745	1095	5472	6567
Uganda	1258	5195	6453	1108	5537	6645
Zambia	418	1463	1881	225	1127	1352

1/ Abstracted from Appendix Table A/2, column 5 (total agricultural personnel).

2/ Abstracted from Appendix Table A/1, items 5.7, 6.7 and 7.

Table relates to text, paragraphs 26-28.

* Concentration of effort.

Ability of the agricultural education systems to meet the quantitative requirements

29. The next step is to see first, if the potential numbers of trained personnel will meet the estimated requirements, and secondly, to ascertain the probable effect of the manpower supply on the possible rate of establishing concentration project areas. Up-to-date information about the existing numbers of trained agricultural personnel in government and quasi-government services, and on the current output of the many training institutions, has not always been readily available. Likewise, it has not been possible to include details of the large numbers of Africans studying agriculture abroad; for many countries, these represent considerable additional resources of trained manpower to those considered here.
30. This latter point is of special relevance in the French-speaking countries, where training institutions may serve several neighbouring countries. Unfortunately it is not known how many students are sent out for training each year by those countries not having their own training institutions and this inevitably leads to some distortion of the figures presented here. For example, from Appendix Table A/3, it would appear that in Dahomey, Gambia, Mauritania, Niger, Togo, Congo (Brazzaville) and Gabon, senior personnel available will steadily decline from the base year to 1985. Where these countries maintain their programmes of training abroad, however, actual shortages in these cases are likely to be much less than those shown.
31. Conversely, for a country with an "inter-state" training institution within its borders, there seemed no alternative but to credit it with the total output of that institution. (An exception here was Makerere University College, Uganda, where the student distribution is known exactly). This, of course, has inflated the "numbers available" in the particular category for that country, although as can be seen from the tables, only in the cases of Central African Republic and Congo (Brazzaville) has this led to any "surplus" by 1985. In other words, they could themselves use the full capacity of the inter-state institution.
32. Although the results from these simplifications adopted may appear somewhat misleading, they do not affect the total requirements as such, for each country, nor, more importantly, the annual number of trained people needed by each country if these requirements are to be met. If anything, they lend emphasis to this key figure. This matter of annual outputs is dealt with more fully later.
33. The method used and the factors allowed for in calculating the total supply of trained agricultural manpower by 1985, are dealt with later. Here, only the totals are considered in relation to the estimated requirements, first, for the general agricultural services, and secondly, for the concentration of effort projects.

(a) Meeting requirements for general agricultural services

34. The agricultural services' requirements are those detailed in Appendix Table A/1. The totals for 1975 and 1985 have been compared with the estimated total supply of trained personnel in these years. The essential details are presented in percentage form, in the first part of Table 5. Full numerical details are given in Appendix Table A/3. Table 5 shows that, at 1975, roughly half the countries could be in a reasonably satisfactory position for total agricultural personnel, although this is due most frequently, to a surplus in one category more or less balancing a deficit in the other, e.g., in Ghana, Ivory Coast, Gabon, Kenya, Malawi and Tanzania. The other half, i.e., Dahomey, Mali, Niger, Nigeria, Togo, Upper Volta, Chad, Congo (Kinshasa), Ethiopia, Madagascar and Uganda, are already showing evidence of a serious shortage of both senior and field-level personnel.

35. By 1985, the overall position is much worse. For only in seven countries is there a prospect of 80 per cent or more of the total requirements being met, i.e., in Ghana, Ivory Coast, Central African Republic, Congo (Brazzaville), Congo (Kinshasa), Tanzania and Zambia. In only five (Ghana, Ivory Coast, Senegal, Central African Republic and Zambia) are the senior level numbers likely to be over 80 per cent of requirements. In several countries, the staffing position could be extremely serious, notably in Dahomey, Niger, Nigeria, Togo, Upper Volta, Chad, Ethiopia, Kenya, Madagascar and Uganda, where only 50 per cent or less of the estimated total needs seem likely to be met. The reservations made in paragraphs 30-32 above have to be borne in mind, however, in the case of the French-speaking West and Central African countries. The additional training outputs needed to overcome these shortages are discussed later (see paragraph 38 et seq.).

(b) Meeting requirements for concentration-of-effort projects

36. The comparatively small requirements for COE projects up to 1975 present no problem. Long before 1985, however, programmes of this kind are likely to be badly handicapped by shortages of trained personnel, generally at both levels and in all countries except Zambia and possibly also Ghana, if the full staffing position for it were known. The expected results, expressed as the proportion of total agricultural families likely to be included in COE projects by 1985, are shown in Table 5 (last column). The more detailed calculations are given in Appendix Table A/4.

37. Before leaving these assessments, two important points should be noted:

(i) Setting all output from the training institutions against government programme requirements assumes that all such people will want to be an could be employed by the government agricultural services; (ii) by allocating all available personnel to the COE projects, assumes each

**Table 5 : Africa south of the Sahara: Trained Agricultural Personnel:
Estimated availability in relation to overall requirements**

Sub-region; country	Nos. trained personnel available as percentage of agric. services require- ments						Agric. families in COE projects as per- centage of total agric. families 1985
	1975			1985			
	Senior	Field	Total	Senior	Field	Total	
		%			%		%
<u>West Africa:</u>							
Dahomey	19	42	38	5	26	23	21
Gambia	22	100	88	8	75	64	60
Ghana	194	86	104	150	66	80	78
Ivory Coast	146	87	97	139	76	86	66
Mali	32	74	67	35	61	57	41
Mauritania	29	102	90	13	76	65	47
Niger	12	56	48	5	54	45	33
Nigeria	37	38	38	21	19	19	22
Senegal	108	91	94	84	63	67	58
Togo	15	50	44	6	43	37	28
Upper Volta	47	54	53	58	30	35	32
<u>Central Africa</u>							
Cameroon	62	99	92	34	64	59	53
Central African Republic	104	96	98	183	80	97	70
Chad	18	58	52	24	49	45	33
Congo (Brazza- ville)	49	316	272	23	326	276	100
Congo (Kinshasa)	29	89	79	34	102	90	70
Gabon	80	117	111	40	85	77	54
<u>East Africa</u>							
Ethiopia	50	19	24	43	15	20	17
Kenya	42	107	96	23	53	48	46
Madagascar	61	81	78	49	50	50	38
Malawi	47	102	93	28	59	54	58
Tanzania	33	106	94	25	78	69	56
Uganda	35	47	45	23	30	29	28
Zambia	113	200	185	172	180	178	100

This table relates to the text, paragraphs 34-46.

government would give absolute priority to these programmes. Both assumptions are unrealistic in practice. The need may arise at a later stage for the agricultural education systems in some countries to be geared to a higher output than is indicated by the present staff estimates.

Annual outputs of trained personnel required

38. The potential supply of trained personnel and the estimated numbers required for agricultural development programmes, have been expressed in terms of annual outputs from the agricultural education and training institutions. These are shown in Table 6 along with the additional annual outputs required (columns 2 and 5) if the total requirements (columns 3 and 6) are to be met by 1985.

39. It should be clearly understood what these figures are and the basis for them. The potential outputs from existing training facilities in each country (columns 1 and 4) are based on the total student capacity of each institution, so far as known, and allow for a wastage or drop-out of 30 per cent over the training period. Because of these two variable factors, i.e., student intake and wastage, these potential outputs do not necessarily correspond with actual outputs at present. It is assumed that the outputs shown in Table 6 will continue at more or less these levels throughout the period from 1968 to 1985. In calculating the additional outputs needed (columns 2 and 5), it is assumed that little physical expansion of training facilities is likely before 1969/70, unless already planned and under way. These outputs have been estimated therefore, on a fifteen-year period only, i.e., from 1971 to 1985. Total output needed (columns 3, 6 and 8) is that required to meet the higher of the two total requirements given in Table 4. This is the key figure and should be looked on as the average annual output of trained personnel required throughout the period from 1971 to 1985.

40. Some of the factors in making these calculations are outlined below. Although in points of detail the method may be open to discussion, the order of expansion needed in the agricultural education systems is clear from a comparison of the present and total outputs in each case. The prospects of obtaining such expansion of numbers are examined in Part III of this Chapter, dealing with manpower strategy.

Existing training levels and institutions

41. For comparison of "supply" and "demand" up to this stage, we have referred only to two broad categories of personnel, namely, "senior" and "field". It is now necessary to try to equate these with the existing levels of training found in the different countries. Ideally, one might hope to find all "senior" personnel with a professional qualification of university level or its equivalent, and the "field" personnel with an intermediate-level qualification, involving a two or three-year course, preferably at post-secondary general education level.

Table 6 : Africa south of the SaharaAnnual outputs of trained personnel:

- (i) Potential outputs from existing training facilities;^{1/}
 (ii) Outputs needed for development programmes to 1985/2/

Country	Senior-level personnel			Field-level personnel			Total annual output	
	Exist- ing poten- tial	Addi- tional needed	Total needed	Exist- ing poten- tial	Addi- tional needed	Total needed	Poten- tial	Needed
	1	2 ^{3/}	3	4	5 ^{3/}	6	7	8
<u>West Africa:</u>								
Dahomey	-4/	33	33	30	130	160	307/	190
Gambia	-4/	4	4	10	4	14	107/	20
Ghana	80	-	80	180	-	180	260	260
Ivory Coast	25	10	35	65	60	125	90	160
Mali	15	70	85	100	160	260	115	350
Mauritania	-4/	16	16	20	25	45	207/	60
Niger	-4/	70	70	85	145	230	857/	300
Nigeria	150	700	850	650	3600	4200	800	5000
Senegal	17	13	30	60	60	120	77	150
Togo	-4/	20	20	25	50	75	257/	100
Upper Volta	30	30	60	50	150	200	80	260
<u>Central Africa:</u>								
Cameroon	15	50	65	130	100	230	145	300
Central African Republic	20	-	20	25	25	50	45	70
Chad	7	53	60	50	130	180	57	240
Congo(Brazzaville)	-4/	8	8	55	-	125/	557/	20
Congo (Kinshasa)	30	150	180	500	100	600	530	780
Gabon	-4/	4	4	5	5	10	57/	14
<u>East Africa:</u>								
Ethiopia	65	195	260	130	920	1050	195	1300
Kenya	20	80	100	195	265	460	215	560
Madagascar	20	60	80	85	180	265	105	350
Malawi	15	45	60	145	125	270	160	330
Tanzania	20	125	145	280	180	460	300	600
Uganda	20	80	100	120	360	480	140	580
Zambia	35	5	40	140	-	1406/	175	180

1/Estimated outputs from national facilities only; based on available student capacity data (see text paragraph 39). Numbers sent overseas are not known.

2/Based on estimated total requirements as shown in Table 4.

3/Additional outputs needed are for the 15-year period from 1971 to 1985.

4/Numbers sent to other African countries for training (i.e., to inter-state institutions) not known. "Additional

output needed" should be reduced accordingly.

5/ Congo(Brazzaville); much of existing potential output (55) is for inter-state needs; average national requirement is estimated at around 12 p.a.

6/ Zambia; present potential output (140) would enable estimated requirements to be reached by about 1981/82.

7/ Incomplete figure.

42. In fact, there are considerable variations within the region, and throughout Africa, one is struck by the range of courses and the large number of staff designations. In attempting to allocate courses and designations to the different training levels, difficulties inevitably arise, particularly through there being two basic educational systems (French and English) in the region. In some instances what may be debatable decisions have had to be made; for example, to bracket the Ingénieur des travaux with the Ingénieur agronome in the university level in the French-speaking countries; also, to include the (upper-intermediate) diplomate as part of the field-level personnel, in the English-speaking countries, although most of them will at present be engaged on senior-level duties. At the other end of the scale, there are staff categories such as moniteur and agricultural instructor, which in some instances have had something less than a full intermediate-level training. Nevertheless, they frequently constitute a major section of the agricultural services and as such they must be taken into account. The important question of the relationship of training levels to occupational needs is discussed in Part II, dealing with qualitative aspects.

Training and staff wastage rates

43. In calculating the probable outputs needed over a period of time, two wastage factors have to be allowed for: (i) the student drop-out or wastage rate occurring between the initial intake or enrolment, and the eventual output of qualified graduates, and (ii) the "staff replacement" rate necessary to maintain the numerical strength of any service. The rates used in this present series of estimations were 30 per cent and 5 per cent respectively. These could be either above or below existing levels. Both factors merit much further research, both as to extent and causes.

(i) Wastage during training: There are few accurate data to go on, but instances are known of wastage rates of over 50 and even 70 per cent at the intermediate level, and of 25 to 40 per cent at universities. Such wastage of effort and resources in the training institutions may well double the cost of each actual graduate, and could indicate among other things, that other career opportunities attract students away after starting agricultural courses, and/or the entry or selection system is inadequate. With properly applied entry standards and guidance to prospective students, there seems no reason why wastage during training should exceed 25 per cent.

(ii) Staff replacement needs: Again, little factual information is available on current rates of staff replacement. Abnormally high losses at the senior levels have occurred in recent years in most of the countries due to expatriates leaving. This has necessitated their urgent replacement, where possible, under technical assistance programmes or by direct recruitment. This is likely to be a continuing feature of the staffing problems at the higher levels for many years ahead. This matter is discussed more fully in Part III, dealing with manpower strategy.

Even at the lower levels, turnover may be as high as 10 per cent per annum, which is several times the rate to be expected in well-run government services. Apart from the high initial training costs incurred with such high rates of turnover, it is difficult to build up a public service of high professional quality, competence, integrity and experience. Without this, all economic development, in agriculture and elsewhere, will be seriously handicapped.

44. This concludes the review of the quantitative aspects of trained manpower requirements for the more purely agricultural services. Consideration of what should comprise the elements of a manpower strategy to meet the serious shortages disclosed here, is postponed until the qualitative and some other relevant factors have been discussed in Part II. The manpower requirements in certain other important fields such as agricultural engineering and farm mechanization, forestry production and forest industries, home economics, dairy and food technology, and veterinary science, are dealt with later in this Chapter or under the respective subject matter Chapters.

PART II: QUALITATIVE ASPECTS OF MANPOWER PLANNING

45. In a broad study of this kind, it would be impossible to go into any great detail on the standard and content of agricultural education and training in the individual countries. All that will be attempted is to draw attention to some important general principles and features which seem to have particular relevance to Africa and to the situation facing these countries at the present time.

46. Staffing and training patterns: In studying the staffing patterns of government agricultural services in Africa, one is struck by the number of categories and the number of grades within the categories. This situation has historical reasons and stems from the development of general education. When the output of secondary schools was very small, and with the need for the agricultural services to get men "on the ground", adequate numbers could be found initially only from the primary schools. These men were given such training as they could absorb - frequently only "on-the-job" - and sufficient to enable them to perform routine duties under supervision, usually by expatriate technical and professional officers. Those with better education and/or proved ability, went on to more advanced training courses designed to equip them for supervisory responsibilities. In the present shortages of senior personnel, many of these men are carrying out duties intended for university graduates in agriculture.

47. With the tremendous improvements in secondary education facilities over much of Africa in recent years, the situation is changing rapidly. As the level of general education rises in a country, there is pressure to raise the entry requirements and training levels of the agricultural services personnel. Thereby, the lowest categories of untrained or poorly trained personnel become redundant and are gradually replaced. This affects the nature of the work of the remaining categories in a service, and such changes should be reflected and indeed anticipated, in the training programmes. To this end there should be an active policy for retraining of the lower levels especially, so that their valuable field experience is not lost and developed within the service. Many developments of this kind are already taking place in Africa.

48. Entry standards - what is important? There are two dangers in this constant process of raising entry standards which are possibly peculiar to agriculture, and which perhaps are not always kept in mind. First, because secondary education facilities in most developing countries are still only accessible to a small proportion of the eligible age group and tend to be concentrated in urban centres rather than in rural areas, raising of entry requirements for agricultural training institutions can further restrict the opportunities of rural children for further education. It must be remembered that, on present average in this part of Africa, for each child who enters secondary school, there are eighteen or nineteen who do not. As a result, entrants to the agricultural

services tend to know less and less about practical farming and about the living conditions of rural people, and once trained, are more reluctant to work in rural areas.

49. A second and related danger arises from the bulk of the rural population in Africa being illiterate and many local communities being still largely tribal in character. It is essential particularly for extension work, first, that there should not be too wide an educational gap between the farming people and the extension worker; secondly, that the latter should have a similar cultural background and be able to talk with the people in their own language. For field-level personnel, therefore, taking courses at below university level, the emphasis should be, first, on recruiting people having these initial advantages, and not only on their school attainments. Secondly, much more emphasis needs to be given to aptitude testing of entrants for their potential ability and willingness to work with and live among rural people, and for a practical approach to farming.

50. Trainee status: In some African countries, entrants to the schools of agriculture, forestry and animal health, are already salaried civil servants. This practice is not conducive to optimum performance by the trainees, and should be changed to one which stimulates a more sustained effort throughout the training course. Accordingly, it is recommended that (i) all entrants to training schools should be put on a normal student basis, supported by scholarships; (ii) scholarships should continue only if the recipient's performance is up to standard; (iii) appointment to the government service should depend on proved ability as attested first, by satisfactory completion of the course, and second, by satisfactory performance during a probationary period in the field. Much of the subsequent wastage in these training stages would be avoided if this probationary field work were done before entry to the formal training course. Such radical changes could not be introduced unilaterally in a country by a ministry of agriculture alone; the necessary steps would require to be taken by the government as a whole, to introduce a competitive element uniformly throughout the public service.

51. Changing patterns: Ideally, there should be only one entry level to the general agricultural services. Thereafter, a man's advancement and promotion should depend primarily on his demonstrated ability, aptitude and field experience, rather than on his acquiring additional paper qualifications. While this principle of having, in general, only one entry level is now the accepted practice in the more highly developed countries, it would be impracticable in Africa probably for many years. But that it will come about should be recognised, and with it that the present pattern of a multiplicity of levels and courses is a phase only, in the development of agricultural education.

52. Number of courses: For example, one can expect that with the expansion of university education, the higher intermediate-level institutions may in time have unused capacity. As the numbers of university graduates increase, they will tend to flow into posts previously held by diplomats. Where a rapid expansion of university facilities is envisaged therefore, considerable caution should be exercised in expanding diploma-level training facilities at the same time. The objective should be to reduce to one the number of formal training levels below university standard as soon as possible. Further, this level should be designed specifically for the job to be done, which is primarily a practical one at field level in the extension and other agricultural services, with parallel courses for such needs as animal health assistants, laboratory technicians, research field assistants, etc.
53. Need for dynamic training system: While in some countries there are encouraging signs of a dynamic system of agricultural education evolving, in many there is still too little evidence of adapting and designing training systems and methods to the needs of Africa. In parts of East Africa, for example, there would seem to be a danger of the system becoming "frozen" on its present three-tier, certificate-diploma-degree pattern. The capital investment being put into each of these levels on their present lines, can only make for less rather than more flexibility in the long-term and make the inevitable changes more difficult. At the same time, complaints are being made about the high cost of training.
54. Job requirement basis: All agricultural education and training is essentially vocational in character; people are being trained for a particular job in agriculture. The first step, therefore, in planning agricultural education is to determine the nature and content of the work to be done by the people when trained. In other words, detailed job-descriptions are required and in this respect the employers - the ministries, public service commissions and the private sector also - must be more constructive and specific than they have been in the past. Only they can provide this information in the detail required. The tendency for agricultural education and training at all levels, to be "education" orientated rather than "job" orientated, must constantly be counteracted.
55. The next step is to decide how best to meet these needs. Employers and educators must jointly determine first, the total training required; secondly, how much of this can be given in formal institutions, and how much can be given only on the job itself. Responsibility for turning out completely trained personnel cannot be laid on the training institutions alone. In the past, employers have tended to complain of deficiencies in the formal training given, without accepting their own responsibilities in the staff training field. In developing countries, the objective should be to get men on to the job with the minimum initial training necessary, in the shortest possible time and at the lowest cost per head. Thereafter, further training should be through an organized system of in-service courses, both formal and non-formal, for those who have shown an ability to benefit themselves and the country in this way.

56. This does not mean simply the provision of a so-called "educational ladder", whereby the person who "does well" in the certificate course, for example, can go on to the diploma course and thence to a university degree. This kind of progression can entail a tremendous waste of time and effort for the individual and the training institutions involved, as well as being expensive to the country. As at present organized, each course is a self-contained unit, rarely tailored to what the student has done before, either in field or in class, nor to what he may do later on. Consequently, there is much needless repetition of subject matter when a student goes on from one to the other.

57. A total programme: What is required is a total programme of planned agricultural education, having a series of suitably graduated parts or stages, each giving an adequate training for the job a man is expected to do. Preferably, there should be a period of active field service after each training stage. If a man is considered fit to go to the next level, he will find the course is a logical sequence to his previous training and also takes cognizance of the field experience he has had in the intervening period. Only in this way, can the largest categories of personnel in the agricultural services be assured that they are not being penalized because, through no fault of theirs, they were unable to obtain a full secondary education. The planning and implementation of this integrated programme should be agreed and shared by the major employers and the training institutions, drawing on all available resources. This comprehensive approach to agricultural education and training, involving the full participation of all concerned, has yet to be evolved in most African countries.

58. Role of the university faculties of agriculture: In such a programme, the university faculties of agriculture would be expected to play a greater part than hitherto, not only in the overall planning of the system but in providing facilities and staff for the shorter, more informal in-service and promotion-type courses. To do this, many would have to be strengthened in several respects. To give the necessary emphasis and attention to education and training problems in agriculture, one urgent need is to establish in each principal faculty of agriculture, a department of agricultural and extension education. These departments should develop a training and research programme on all aspects of teaching agricultural subjects at different levels. They should undertake research and experimentation in collaboration with ministries of agriculture and education, and other bodies, to find out how best to apply and implement the findings of the technical departments. In their teaching programme, the staffs of these university departments have an important part to play in producing a new type of agricultural teacher who would possess both the technical knowledge and the attitude, ability and resourcefulness needed to train agricultural field staff in how to work effectively with farmers.

59. Post-graduate research and education: At the university level particularly, research is a vital corollary to agricultural education. Indeed, without an active research programme related to the urgent problems of

agricultural development, much of the teaching loses its essential practical application and relevance. Throughout these countries of Africa, there are many first-class agricultural research centres, several with international reputations. Arising mainly from historical reasons, there has been, unfortunately, a much too rigid separation of research from teaching. Apart from the pressing need to make the fullest use of these scarce manpower resources, advantages are to be gained from involving research people in university level education. It is equally desirable that university faculties participate in those national agricultural research activities in which they are best placed to make a contribution, provided always that this is not carried to the point where teaching becomes secondary to research. For example, more systematic socio-economic studies are needed into all aspects of rural life, so that teaching is directly related to local farming conditions and to provide a factual basis for extension and agricultural development programmes. To this end, to serve the needs of these countries as a whole, two or three strong graduate schools should be developed, each attached to a well-established faculty of agriculture where good facilities exist for post-graduate students to work on problems affecting their own country. This is not underrating the value to the individual and his country of such studies being done abroad, but there is more urgent need for this kind of research work to be done in Africa.

60. Higher management training: In all countries and in all sectors, including agriculture, there is an acute shortage of Africans with high-level management training and experience - an area which until recently has been manned almost exclusively by expatriate personnel. With the increasing scope, pace and complexity of economic development, the higher civil servant is becoming more deeply involved in important decision-making functions, the effects of which can be far-reaching, politically and economically. His dilemma is frequently complicated by the many and sometimes conflicting recommendations on development strategy from various influential bodies and aid-giving agencies. There is an urgent need for universities (and institutes of management) to explore ways and means of better equipping these men for their wider responsibilities.

61. Intermediate-level training institutions: Direction: In most countries, these centres are a relatively small part of the overall responsibilities of the ministry of agriculture and their special functions and needs may suffer in consequence, from lack of adequate direction and support in the ministry. There is need for a higher level of competence in the processes of education as such, in the systematic planning of syllabi according to modern teaching/learning objectives, and in designing courses more in terms of job requirements rather than of subject matter coverage. Within ministries there is need for a full-time unit or division, depending on the scale of operations, with experienced personnel in these fields, for the proper direction and supervision of training programmes. This unit could cover not only the agricultural schools or colleges, but also the in-service training programme, farmer training centres, where these exist, and the preparation and distribution of teaching materials and audio-visual aids.

62. Staffing: The key position of the intermediate-level institutions in the provision of trained personnel, necessitates their being adequately staffed, yet this is frequently their most unsatisfactory feature. In many, changes of teaching staff are numerous, and make continuity of teaching and of policy difficult. This arises from the common practice of staffing such centres by transfer from other branches of the agricultural services, often regardless of the special aptitudes and training needed for successful teaching. This militates against building any tradition and status in these institutions.

63. Measures are urgently needed to improve the professional status, prospects and efficiency of agricultural teaching staff at all levels. To this end, every effort should be made to establish agricultural teaching as a profession in its own right, offering career prospects which attract the best men. Until such professional people are available, only those most technically and temperamentally suited should be transferred to teaching duties. Further, continuation on this work should not prejudice promotion prospects or salary grading. All training staffs should have periodic short courses in teaching methods and aids, and in other appropriate subject matter.

64. Teaching materials: Equally pressing at every level, is the need for textbooks, audio-visual and other teaching aids, all of high quality and all prepared within the context of African agriculture. Adequate library facilities in the higher institutions, and opportunities for students to use them, are related needs in agricultural education in Africa. Foremost among the teaching equipment for all levels, must be good facilities for practical farming and other related field work.

Farming experience and other essential training

65. A lack of knowledge and experience of practical farming is probably the outstanding deficiency of most agricultural education and training in Africa at the present time. This shows up most clearly when staff are faced with the practical problems of agricultural development projects such as land settlement. Admittedly, the difficulties of providing such practical training are great, especially in areas where well-run, commercial-scale farms are rare and where farming for the most part still follows the traditional pattern of small scattered areas, primitive tools and of low and uncertain returns. But this is an aspect of formal agricultural education to which the authorities in the developing countries generally have not given sufficient attention. In Africa, a special responsibility in this matter devolves on the teaching institutions.

66. What is needed from the training institutions are men who can interpret to the farmer the changes which he has to make to bring him step from one type of farming to another type. This does not necessarily mean that the man to do this job must have a high level of formal education. (Among other factors, this is a function of (i) the educational

level of the farmers with whom he is working, and (ii) the intensity level of the farm management operations.) But it does mean that he must be thoroughly familiar with every detail of the farmers' present methods of farming; that he must know how - i.e. with his own hands - to put the various steps of improvement into practice (and at the proper time and in the correct order); and finally he must know what the "end product", his objective, should look like.

67. To be able to do this job, the implications for a man's background and training are clear - it must be very practical. But - a practice geared directly to the changes which he is expected to put into operation in moving farmers from their present farming to the improved farming. He must know physically, mentally and economically, what is involved for the farmer in every operation of the process. In effect, he must be thoroughly familiar not with one system of farming but with two - where the farmer is now and where he wants him to go.

68. Extension training: In addition to farming experience, personnel for direct extension work must be thoroughly drilled and practised in the few extension methods appropriate in such conditions, i.e. method and result demonstrations, how to approach, work and talk with farmers; protocol to be observed in dealing with village headmen, local chiefs; respect for customs, religious beliefs, and so on. The high principles of motivation and character expected of extension personnel should be instilled at the same time. Those who by inclination or temperament are unsuited for such duties, should be employed in the non-extension services.

69. Put in its simplest terms, in the science of agriculture, we are dealing with soil, plants and animals. In the application of that knowledge we are dealing with people. Every student should have at least a basic knowledge and understanding of the people among whom and for whom he will be working, of their problems, their needs, and of their physical, mental and economic resources. There is a close link between this kind of background knowledge for extension work, and practical farming experience; the two should be combined, wherever possible, in all training programmes. Extension education of this type should be a regular part of all intermediate and university courses in agriculture and related subjects.

70. These are the basic requirements for field-level staff in the agricultural services, no matter whether their initial training is at the university or the intermediate level. Nothing absolves those in the higher ranks of the services - other than perhaps administrators and some subject-matter specialists - from having the same practical knowledge, experience and training. Without it - and much more as well, of course - they cannot be expected to plan and implement effective and successful programmes of agricultural development.

Services for work with rural women

71. No discussion of the needs for trained personnel for agricultural development would be complete without some reference to the special needs of rural women. The importance of women in the economy of Africa is something which cannot be overlooked when considering agricultural development or when planning services to the farming and rural communities. In several strategic areas, women are an active force and influence. The part which women play, for example,

- (i) in agricultural production in many countries
- (ii) in trading, processing and marketing
- (iii) in producing and rearing future generations, and
- (iv) in family, village and national development,

emphasises the key position which they hold and how much future development and the raising of standards of living may depend on whether the women are a force for progress or for reaction.

72. The strongest reaction and resistance to change is encountered at the lowest levels of income, such as is found in most traditional farming areas. People living at, or close to, the subsistence level cannot afford to take risks with their limited resources, and ignorance superstition and fear of the unknown, pose particularly stubborn barriers in the way of progress. Much of the attitude of people in these circumstances stems from their low level of education and training. It is important, therefore, for all rural development, that women's education should move forward in step with that of men. This applies to general education as much as to the training of women in their own special fields of responsibility.

73. Research for development: It is encouraging to see that many ministries of agriculture, by providing a growing number of training facilities for women, are recognizing their wider responsibilities to rural families as a whole, and not solely to farmers as such. Valuable information on the place of women in the rural community has come from a variety of ad hoc socio-economic studies. There is strong justification for putting research work into the part played by rural women in the economy on to a more permanent and continuing basis.

74. Such research work is a necessary corollary to adequate teaching and to providing a sound basis for extension work programmes. It is also being found that such studies are needed in the initial phases of comprehensive rural development schemes, such as farm settlements, which of necessity, cut across many traditional patterns and customs. How well the women, as well as the men, adjust to such radical changes, how they will use the opportunities which such schemes offer for larger family incomes, better housing and improved living generally, and the extent to which the women are prepared to take a full and active part in the schemes, may well be a determining factor as to whether a scheme will or will not succeed.

75. Special training problems: The unique position/of African women creates unique problems in the training of personnel to work with them. These are discussed more fully elsewhere, but within the context of this chapter, the particular need and challenge is to devise training courses, at the different levels, which reflect the work pattern of rural women in Africa. To meet the need, the training must be a suitable combination of agriculture and home economics, without the necessity of taking two separate courses of study, as is frequently the case at present. No country can afford the time or resources for such lengthy training periods for these levels of personnel.

76. Employment: Reference has been made here only to the agricultural development aspect of training for women. There are, of course, many other sides to this broad subject which are outside the scope of this study. A brief indication of the possible numbers of trained women required was given earlier in the quantitative section dealing with the concentration of effort projects (see para. 25 and Appendix Table A/2). For a full programme of agricultural development, there is need for the closest integration between the agricultural extension services and the home economics services.

PART III - DEVELOPING A MANPOWER STRATEGY

77. What has been done up to this point is to determine the probable total needs for agricultural professional and technical personnel. The extent to which these needs become effective demands depends entirely on the policies and priorities determined by the individual governments. There is absolutely no point in a country setting out to make major changes in its agricultural education system on the scale indicated here, if it is unable at the same time, to establish and implement the programmes on which the trained personnel would be employed. Only the respective sovereign governments can decide how far along the road indicated in this Indicative Plan they are prepared to go or feel capable of travelling. Obviously, what they spend on agricultural development cannot be spent on some other sector of the economy. This is typical of the difficult decisions which developing countries have to make in allocating scarce resources in the most effective way.

78. Over the long time span covered by the Indicative Plan, it is neither feasible nor wise to attempt here more than broad generalizations. It is impossible for example, to foresee what may result from the rapidly advancing technologies in all fields, or what revolutionary changes may be possible from the new communications systems, and the effects which both of these might have on the future requirements and deployment of trained manpower in agriculture. Nevertheless, it will remain true that whatever is done in agricultural development must be paralleled in agricultural education and training, and vice versa. At the same time, it will be appreciated that having all the trained personnel required does not automatically ensure that agricultural production will rise. Apart from such factors as the quality and utilization of the personnel, touched on later, many other things are involved, and in no country or sector of the economy, is productivity directly linked with either professional or general educational qualifications. But it is equally obvious that if agricultural development is to be carried out on the scale necessary, it will entail a massive programme of education and training involving every member of the farming community. Clearly, trained manpower is a key issue.

79. Phasing demand: With these factors in mind, what further guidance can be offered on the question of numbers of trained personnel? The first step is to look again at the total requirements. As stated earlier, the relatively small numbers required for the recommended concentration of effort program up to 1975, should present no serious problem in any country, so far as can be seen, provided all existing training institutions operate to capacity. Beyond that point it would clearly be unrealistic, for many reasons, to expect that every country could attain or should even attempt, one hundred per cent coverage of its people by 1985. What further phasing might be introduced, therefore, which would still leave an effective programme, in terms of overall production, and at the same time, make less onerous demands for trained manpower?

80. Referring to the estimates in Appendix Table A/2, it will be seen that if for example, such countries as Cameroon, Ethiopia and Senegal, were to decide as a first phase, to limit their 1985 objective to coverage of

the high density areas (i.e. type (i) projects) and to maintain agricultural services to the other sectors of the rural community at no more than existing levels, this would more or less halve the additional outputs of trained personnel which they would require, as indicated in Table 6 (cols. 2 and 5). With countries such as Congo (Kinshasa), Ivory Coast, Madagascar and Tanzania, the possible reduction would be even greater, and with some others, e.g. Dahomey, Gambia, Kenya, Togo, Uganda and Upper Volta, the effect would be less, giving a reduction of roughly one-third. For some of the latter group, the remaining requirements may still be too high.

81. With two other groups of countries an indicator on this basis is more difficult to determine at this distance. First, there are countries such as Malawi and Nigeria, with a more or less uniformly high average rural population density, resulting in practically all project areas being of type (i). Secondly, the opposite group, notably Central African Republic, Chad, Gabon, Mali, Mauritania and Niger, having relatively scattered populations and where all project areas would be of type (ii). In these instances some of the other criteria used to decide priorities in selecting project areas would become the dominant factors, in addition to the obvious one of starting with areas with most agricultural potential. Staffing requirements could be adjusted accordingly.

82. Obviously, these are matters which can only be decided by the policy makers and planners at the national level. Only there can all the necessary facts be found and all considerations weighed. In many instances, special prior investigations and surveys may be necessary on which to base the policy decisions. Likewise, only careful study at the national level can determine what actual changes are both necessary and feasible in a country's system of agricultural education and training. These are areas in which help from FAO could be requested by member governments.

83. Adjusting supply: Once national objectives have been determined and policy decisions taken which affect the demand for trained manpower, the question of supply can be tackled. The more detailed requirements for professional and technical personnel will become clearer over the short term, and all estimations should be kept under constant review as fuller and better data become available. One cannot wait for this clearer picture however. The magnitude of the needs indicated over the long term, make it imperative for each country to have a deliberate manpower strategy. This cannot be left to chance nor solely to the educators. The strategy should incorporate the decisions and policies arrived at in accordance with the objectives and the facts, and be sufficiently flexible to cope with changing circumstances. Much more is required than a simple expansion of training facilities.

84. Elements of a manpower strategy: A practical manpower strategy should cover the conservation of existing resources, the improvement of quality as well as expansion of numbers, opportunities and incentives for

advancement, the most effective utilization of all levels, and the co-ordination of the manpower strategy with other aspects of social, economic and educational planning. These principles apply to all forms of manpower planning but are of special relevance to the agricultural sector if only because of their being largely neglected hitherto.

85. Four routes are open to countries to increase their resources of trained manpower in the professional and technical categories: (i) upgrading and development through in-service training programmes, within the structure of the agricultural services; (ii) increased annual outputs from a country's own education and training system; (iii) training abroad; (iv) recruitment from abroad. In the majority of the African countries all four already have a place; for most countries they will have to be continued and intensified. Important policy decisions have to be taken on each in formulating a practical manpower strategy. The several key elements of such a strategy for agricultural manpower at the professional and technical levels, are discussed below.

86. (i) Better utilization of personnel: Is the most effective use being made of existing scarce resources of trained personnel? For the African countries, probably the first question here is how to make the most effective use of existing expatriate personnel. Undoubtedly their role should increasingly be that of trainers of local personnel, and not simply as "stop-gaps". Seen and used in this way, expatriate staff in all fields, both public and private, could make a tremendous contribution towards solving the trained manpower problem. Wherever possible, it should be part of the contract agreement with every foreign individual, company or concession, that they also have a training function to perform. This aspect should be a key factor in making policy decisions on rate of expatriate replacement by Africans.

87. A second question calling for immediate study is, do senior and professional staff have the necessary junior and clerical staff to assist them, or are they under-utilized through having to perform tasks which could be done equally well by less highly trained and less costly personnel? Practical staff ratios need to be determined and applied.

88. Thirdly, are all levels and especially field personnel, being equipped to do their job? Are sufficient funds and equipment made available for transport and travel within their area, for teaching and demonstration materials, supplies for farm services (fertilizers, seeds, tools, insecticides, vaccines, etc.)? Too frequently this aspect of staffing tends to be overlooked or inadequately provided for by administrators. For most agricultural services, these costs can be expected to at least equal the budget for salaries and personal emoluments.

89. (ii) Upgrading and training within the agricultural services: Closely related to utilization, discussed above, is the upgrading and training of staff within the agricultural services, i.e. in-service training. The investment in staff, represented by their pre-service training

and subsequent job experience, should be under a process of continual development. For this, a thorough job appraisal should first be made, to determine who does what in every post within the service, and the training content of each job. Based on these findings there should be a range of upgrading courses for existing personnel, designed to impart and increase special job skills. This applies, especially in agriculture, to those skills which, because of the nature of the work or of the environment, cannot be imparted other than on the job itself, e.g. much of extension work, marketing, estate and plantation management, etc. This is a major responsibility of the employers; too much cannot be expected of the formal training institutions, as neither the capacity nor the finance are likely to be available.

90. (iii) Service structure: Implied in both a more effective use of personnel and an upgrading, in-service training programme, is an immediate review of the structure of each agricultural service. The complex grading pattern of many existing ones and the number of formal training levels associated with the grading, have been commented on already (para.42). Both of these features, while providing safeguards against nepotism and political pressure in matters of staff appointments and promotions, are obstacles to the development of a progressive manpower strategy. Initial entry point and subsequent grading within the services are in general, tied much too rigidly to initial educational/training qualifications. The diagram (page 34) attempts to illustrate this relationship for both the English and French-speaking countries.

91. The extent to which staff so trained and graded can be interchangeable, was first touched on when discussing the "senior" and "field-level" personnel (paras. 41 *et seq.*). Depending entirely on availability, a considerable degree of flexibility is possible. This raises a fundamental question, of how much training is in fact needed for each particular job? If for example (as is happening everywhere) supervisory duties are done effectively by the more experienced intermediate-level staff, then on grounds of expense alone, there is no justification for appointing or training university graduates for such work. If this is accepted, a significant revision of the future staff requirements becomes possible, in that, say, only half of the "senior" personnel required need be of university level. The other 50 per cent would of course, have to be added to the intermediate needs as it is from their ranks that these senior personnel would be drawn (see Table 6, cols. 2 and 5). Not only would increased numbers be available in this way, but they would be available in a shorter time and at less cost. Such a policy also gives further promotion opportunities and incentives to this category of personnel.

92. (iv) Salary scales and incentives: The next element of manpower strategy is that of salary scales, incentives and career prospects in the agricultural services. Government salary scales and differentials as they affect the agricultural services, need to be reappraised in the light of each country's needs, resources and priorities. In many instances the large differentials between, for example, certificate-level and

Africa south of the Sahara

Agricultural staff; training levels, designations and functions

Diagram

FRENCH-SPEAKING COUNTRIES

ENGLISH-SPEAKING COUNTRIES

Total years educn.	Agric. training level	Service designation	Function group 1/ 2	Service designation	Agric. training level	Total years educn.
16-19	University	Ingénieur agronome and above	I	Agricultural officer and above	University	15-18
14-17	Superior	Ingénieur des travaux, etc.	I	Agricultural Superinten- dent		
11-14	2nd cycle secondary	Adjoint technique Assistant d'élevage Conducteur d'agricul- ture Contrôleur	I/II I/II	Asst. Agric. Superinten- dent Field officer Livestock superintendent Technical officer	Diploma (Intermediate 2)	14-16
7-10	1st cycle secondary	Agent technique Infirmier-vétérinaire Moniteur d'agricul- ture, etc.	II	Agricultural Assistant Animal health asst. Field assistant Technical assistant	Certificate (Intermediate 1)	12-14
5-6	Short pre-service and/or on-the-job training	Agent de culture Encadreur Moniteur d'agricul- ture	II	Agricultural demon- strator Agricultural instructor Animal health asst. Field overseer	Short pre-service and/or on-the-job training	7-9

Note: All countries do not necessarily have all agricultural training levels shown. Also, many of the service designations shown are alternative equivalents, usage varying from country to country.

1/ Function group I: Senior, supervisory and specialist staff. II: Operational field-level personnel. Availability of any one level affects function of those above and below it.

diploma-level grades, and between these and university graduates, cannot now be justified in terms of educational differences. Current salary scales are frequently a carry-over or continuation of scales drawn up originally for expatriate personnel; they are tied much too rigidly to formal training qualifications, and, in common with all government salary scales, tend to be higher than is justified. Salary differentials more favourable to the intermediate or technical levels - particularly for field work - would have a major influence in attracting young people into these vital services, and in inducing them to stay.

93. Staff incentives: Agricultural development does not take place in towns and cities and the natural tendency of educated people to prefer the many facilities which urban surroundings offer, has to be counteracted. This is not simply a matter of salary level, although in most instances, a special allowance would be a powerful inducement to live in rural and remote areas. Often equally important are acceptable housing, medical, social and educational facilities in such out-stations, especially for men with family responsibilities.

94. Career prospects: Closely related to incentives, are the opportunities for advancement and promotion within the agricultural services, especially for those large numbers entering at the field-level. Much of the attractiveness or otherwise of these services to young people will depend on the career prospects which they are seen to offer in comparison to other opportunities open to them. The upgrading system recommended above could be an important influence here.

95. (v) Increasing outputs from internal training system: This has several important facets.

Availability of entrants: Availability of entrants for the different levels and branches of agricultural education and training must be taken into consideration in planning any expansion or upgrading. The output of the different levels of the general education system must be known, together with the progressive rate of increase over the planning period. In some countries, low output from the secondary schools, especially in science subjects, may be the limiting factor for entrants to the intermediate or technical level, as well as for university level. Entry levels to the agricultural education and training system have to be adjusted accordingly.

96. Training policy: Subject to other attributes (see para. 48), entrance educational standards have to be lowered to the point where the necessary numbers are available. Staffing structure, supervision ratios and subsequent training policy will all be influenced by this factor. The lower this initial level has to be, the more necessary does the upgrading programme (para. 89) become, and the more important is it that the numbers of trained personnel brought in direct at higher levels, do not block the promotion prospects of the lower levels.

97. The twin objectives of training policy should be (i) to reduce progressively, the number of formal training levels (see para. 52) while at the same time intensifying the in-service training programme; (ii) to get men on to the job in the shortest time and at the lowest cost (see para. 55).

98. At the higher levels of training, the effective policies adopted by several African governments, of "steering" students into training for key industries such as agriculture, by means of an attractive scholarship programme restricted to the priority occupations, are to be strongly recommended. The proportion of scholarships allocated for agricultural subjects needs to be increased and the policy should be weighted in favour of students from rural areas. Consideration should be given to putting all such scholarships on a repayable loan basis. The terms of repayment can be varied according to the recipient's choice of job and its relative priority grading.

99. All training should be preceded or followed by a probationary period of active field work to determine the suitability and interests of each candidate (see para. 50). All entrants to the agricultural services, at whatever training level, should begin at the operational field level so that all have experience and an understanding of the work involved.

100. Intermediate level: The outstanding priority in most countries, is for greatly increased numbers of intermediate or technical level personnel. How is this expansion to be achieved? Is it necessary in every case to establish new training centres - can existing ones be expanded - how much grouping together of different services' trainees is possible (e.g. agriculture, animal health, forestry, home economics) with considerable savings in buildings, staff and basic services?

101. What part can the university faculties of agriculture, and their departments of agricultural and extension education, play in such a programme? Do any have the physical facilities and staff to carry out part of the intermediate training? Could they assist - in conjunction with employers - with the part-time, in-service and refresher courses necessary for personnel development and advancement at all levels? What part can the agricultural industry itself play in the total training programme?

102. Need for total programme, total effort: The foregoing questions must be asked in framing a manpower strategy. They can only be answered by and within each individual country. The objective must be a total programme of training, both formal and continuing, making the fullest use of existing resources before creating new ones, with the maximum degree of flexibility to meet new and changing demands, and closely integrated with the country's overall development.

103. University level: Expansion of through-put of the university faculties to meet the anticipated greater demand, should not be made at the expense of quality. This will entail the professional replanning of many

courses, a much higher competence in teaching methods, more enlightened use of improved practical farming and field study facilities, and a drastic review of subject matter content. Such changes of emphasis and of method, to produce the type of graduate needed for national development, do not imply any reduction of university standards.

104. With the high capital cost per student place, especially in science-based subjects such as agriculture, the maximum possible use should be made of all lecture rooms and laboratories. Before new ones are added, the time existing facilities are actually in use should be studied. The possibilities of "shift systems" for maximum use should be explored in all training institutions.

105. The most important shortage at this level of manpower, is in high quality teaching/research staff. These are key personnel in the whole manpower programme, as the improvement of graduate quality at all levels, depends in the long run on the quality of the teaching staff. To obtain these, more and better facilities for relevant post-graduate research work are needed within the agricultural faculties in Africa (see para.59).

106. (vi) Training abroad: Closely related to internal training policy (para. 96), is the question of training abroad. In the sense that this means training overseas, i.e. outside of Africa, the policy should be to make less and less use of this method of training, other than in certain specialized fields, at the higher level, and only after a man has had a thorough training and several years of actual working experience in his own country. There is everything to be gained from initial training and experience being obtained in the conditions and environment with which the trainee is familiar and in which he will work once qualified.

107. Within Africa, every economy should be exercised by making the fullest use of the many excellent facilities which now exist, especially at university level and in a wide range of agricultural and related subjects. These are expensive to provide and staff, and unnecessary duplication should be avoided. At the intermediate level, on the other hand, the numbers required now and in the future are such that there are few if any countries which cannot justify having their own full training facilities for this category of agricultural personnel. With the variations in local customs, language and farming conditions, it is strongly recommended that each country should have full control of training its own personnel at this level.

108. (vii) Recruitment from abroad: Shortages of key personnel in a developing country usually mean one of two things; either the development plans dependent on these personnel have to be deferred until trained nationals are available, or the necessary skills have to be imported. This involves a political decision of major importance. Most developing countries have endeavoured to meet such needs for high-level manpower, first, by direct recruitment, and secondly, through the many technical assistance programmes of bilateral and international bodies.

109. The whole character of this problem has changed considerably in recent years. The upsurge of economic development and scientific technology in all fields has created a tremendous demand for highly skilled personnel throughout the world. In comparative terms, therefore, short-term contracts in developing countries are now much less attractive to foreign personnel, unless they form an integral part of their home country job, and involve no break in continuity of their own work, nor in their security and long-term prospects. All this points to an extension of secondment type arrangements, of "partnerships" between two similar institutions, and of increased technical assistance of this kind. These factors need to be reflected in the manpower strategy of both developing and developed countries.

110. By making maximum use of such foreign personnel as trainers (see para. 86), many needs can be met fairly quickly from a country's own resources by training counterpart personnel on the job. It is now being found, however, that there is a hard core of high-level manpower needs, requiring advanced scientific and research training, coupled with considerable post-training experience. The feature of this personnel is the long lead-time required to produce them. If local people are to be trained at all adequately, and if at the same time the country's development plans are to proceed, it is evident that outside resources will have to be used for the intervening period, which may be considerable. This also shows clearly that the future emphasis of technical assistance in agriculture should be on education, training and research. These long-term operations are basic essentials to progress in all developing countries and in their requests for technical assistance, governments should attach the highest priority to these key occupations.

111. (viii) Machinery for manpower planning and strategy: The importance, complexity and continuing nature of a sound, practical strategy for trained agricultural manpower, as outlined above, indicate the need for an effective government machinery to frame, guide and implement the policies. The basic needs at the national level are seen to be two; namely, one body concerned primarily with manpower problems, and a second to deal with the particular problems of agricultural education and training.

(1) Body for overall manpower policy and planning: Many countries already have a manpower board, planning unit or its equivalent, placed at an appropriately strategic position in the government's economic planning machinery. If not, one should be set up and all should include in their responsibilities, the trained manpower requirements for the agricultural sector.

(2) Co-ordinating body for agricultural education and training: In the larger countries, there are advantages in having at the national level, a body directly responsible for the co-ordination of all agricultural education and training. It can play a key role in bringing together the training institutions and the employers. Obviously, there should be close working relationships between it and the above manpower board in

their joint efforts to reconcile supply and demand in the agricultural sector. Both bodies, from their different viewpoints, would have an interest in all of the foregoing matters of manpower policy and strategy.

112. Manpower research: Planning and implementing an effective manpower strategy requires basic information and data. First essential is a detailed survey of all existing resources. Further research work is needed on speedier and cheaper training methods (including building and equipment capital costs), on wastage and other training costs, on anticipating changes in requirements, on salary scales and incentives, on staffing patterns and utilization of trained people. Responsibility for initiating and co-ordinating such research work should lie primarily with the national manpower planning unit.

PART IV - FINANCIAL IMPLICATIONS OF MANPOWER REQUIREMENTS

Agricultural services - recurrent staffing costs:

113. To attempt more than an approximation of the recurrent costs to governments of the personnel requirements in the foregoing sections, would entail much more data for the individual countries than are available to FAO. For trained co-operative personnel, for example, any realistic estimation of costs is virtually impossible owing to the many ways of organizing co-operative societies and in the extent to which these bodies are integrated with or controlled by government administrations. Farther, although initially most if not all of the costs of the co-operatives' personnel will be borne by governments, it is expected that the staff and their costs will be rapidly absorbed into the co-operative system and will not thereafter be a charge on government funds. For these reasons, co-operative staff costs are not included in the calculations which follow.

114. Average costs: A measure of the expenditure involved in the staffing levels recommended for the agricultural services (Appendix Table A/1) has been attempted by first determining an average cost per technical staff member in at least one identifiable government agricultural service in each country. Detailed budgets were not always available, but wherever possible the cost in each case has been broken down under two headings: (i) "technical personnel costs" covering salaries and all emoluments and allowances for the professional and technical staff; (ii) "other expenses" or service-operating costs covering the non-technical staff costs (clerks, drivers, etc.) plus office, administrative, travel, equipment and supplies costs. It has not been possible to determine separate costs of this kind for senior and intermediate-level personnel. For 1975 and 1985, the average costs per head have been kept constant.

115. The rounded figures used are given in the first part of Table 7. It must be stressed that due to wide variations in accounting practices alone and general lack of specific information, there is little or no basis for comparison in these country by country figures at this point. Even so, the figures for Ghana seem exceptionally low. Data for Ethiopia were insufficient at time of writing; in this case the regional average cost was used in the subsequent calculations.

116. The only adjustment made to the individual costs was that where the costs for "other expenses" were less than technical personnel costs, the former item was increased to make both equal before calculating the 1975 and 1985 totals. It is now generally accepted that to be able to carry out its field activities at a constantly adequate level, an agricultural service, for example, requires on average, an operating budget not less than the total personnel budget.

117. Total costs: Using these average costs, the estimated total expenditure for each country has been calculated for the two key years. ^{1/} These total costs have then been expressed as a percentage of total GDP for these

^{1/} Using the total staff estimates from Appendix Table A/1, item 7.

years. The results are shown in Table 7. The percentage GDP figures seem to fall into three groups. On the 1985 figures nine countries have percentages of 0.53 or less, a further thirteen fall between 0.97 and 1.77 per cent, while two have much higher figures (Uganda 2.38 and Malawi 4.37).

118. Unfortunately, there are no similar current data available, nor as yet any "yardsticks" against which to compare these percentages or to assess their significance. There does, however, seem to be a fairly close inverse relationship between this percentage and the total GDP per head of total population, also given in Table 7 (of Gabon and Malawi). Further, if the computation used here has any relevance, it does emphasize the need for those countries at the higher percentage levels, to review their agricultural manpower needs and costs, as outlined in Part III of this Chapter.

Agricultural education and training costs

119. Average costs: From information available on budgets and student enrolment, certain minimum average costs for agricultural education and training have been worked out for the two main levels, university and intermediate. The university costs refer only to the undergraduate courses and do not contain any element of post-graduate training costs. For the intermediate level, the costs given refer only to the lower of the two main levels, i.e., the "certificate" or first cycle secondary; these courses are either of two or at most three years duration. This has been done because (a) the largest numbers required are at this level, and (b) in this respect the upper intermediate level can be regarded more as an alternative to the university level. As all the "senior" personnel requirements have been costed at university degree level, the more these needs can be switched to upper-intermediate type personnel, the greater the financial saving will be on the total costs discussed below.

120. The details are given in Table 8. As there is as yet no standard procedure for compiling costs of this kind, the information available (columns 1 and 5) is variable, and few data give an accurate picture of total costs per student and, less so, per graduate. Consequently, a high degree of standardization has been inevitable in the "figure used" (columns 2 and 6) for calculating the subsequent costs. This figure has been adjusted downwards in some cases where it is expected or assumed that increased student numbers will lead to an overall reduction of costs per head. In all cases the figure is intended to cover also in-training salary, scholarship or other payments made to students. The large variations in costs per course (columns 3 and 7) are due mainly to whether a particular course is 2 years or 3 years at the intermediate level, or of 3, 4 or 5 years at the university level. In the estimated costs per graduate produced (columns 4 and 8) allowance is made for student wastage occurring during the training period; as discussed earlier (paragraph 43) throughout these manpower estimations, this wastage has been assumed to be 30 per cent.

Table 7 : Africa south of the Sahara

Estimated total annual staff costs, 1975 and 1985^{1/}, and their relationship to total GDP

Country	Average costs/head (US\$)				Estimated total costs, 1975	Estimated total costs, 1985	Total cost at % GDP 2/		Total GDP/head (HV) 1985
	Technical personnel costs	Other expenses	Total	Adjusted total			1975	1985	
	3/				(million \$)	(million \$)			4/
<u>West Africa</u>									
Dahomey	1100	1000	2100	2200	2.3	4.8	1.00	1.41	87
Gambia	...	...	3800	3800	0.4	0.8	1.14	1.54	105
Ghana	700	800	1500	1500	2.8	6.1	0.11	0.14	308
Ivory Coast	2000	2000	4000	4000	4.6	6.5	0.28	0.23	456
Mali	1900	250	2150	3800	7.5	11.3	1.74	1.77	86
Mauritania	1800	1200	3000	3600	1.4	2.1	0.52	0.53	263
Niger	1400	1000	2400	2800	4.6	7.1	1.23	1.27	103
Nigeria	1300	2100	3400	3400	69.7	193.5	0.98	1.58	114
Senegal	1400	2300	3700	3700	3.7	6.4	0.36	0.42	292
Togo	2000	1100	3100	4000	2.2	3.7	1.16	1.30	104
Upper Volta	1100	1300	2400	2400	3.5	7.3	1.08	1.59	63
<u>Central Africa</u>									
Cameroon	2200	2500	4700	4700	8.8	17.5	0.84	0.97	253
Central African Republic	1400	1700	3100	3100	1.7	2.1	0.70	0.53	213
Chad	1200	1700	2900	2900	4.2	5.9	1.40	1.33	89
Congo (Brazzaville)	1800	3300	5100	5000	1.1	1.5	0.47	0.43	295
Congo (Kinshasa)	1200	1900	3100	3100	15.2	22.3	0.58	0.52	170
Gabon	2000	1000	3000	4000	0.6	0.7	0.15	0.11	1185
<u>East Africa</u>									
Ethiopia 5/	...	...	...	3400	23.7	45.5	1.44	1.65	82
Kenya	2600	...	...	5200	15.9	37.6	1.12	1.57	150
Madagascar	...	...	...	5300	12.7	21.0	1.19	1.20	164
Malawi	2000	2200	4200	4200	6.5	16.4	2.71	4.37	54
Tanzania	...	...	3700	3700	13.9	24.3	1.15	1.18	125
Uganda	...	...	4900	4900	14.7	32.6	1.75	2.38	120
Zambia	1800	3800	5600	5600	5.2	7.8	0.45	0.39	296

Total staff refers to estimated requirements in Appendix Table A/1, item 7.

Total gross domestic product - high variant.

Professional and technical staff only; non-technical staff costs included with "other expenses" where known.

Estimated Total GDP (high variant) per head of total population, 1985. (US\$)

Ethiopia; no data available; regional average cost used.

Table 8 : Africa south of the Sahara

Agricultural education: (a) average annual cost per student, 1/
 (b) total cost per course, (c) estimated cost per graduate (US\$)

Country	University level 2/				Intermediate level (lower) 3/			
	Current cost per ann.	Figure used	Cost per full course ^{4/}	Est. cost/graduate ^{5/}	Current cost per ann.	Figure used	Cost per full course ^{4/}	Est. cost/graduate
	1.	2.	3.	4.	5.	6.	7.	8.
West Africa								
Dahomey	...	4000	16000	22500	800	800	2400	3400
Gambia	-	3000	9000	12500	-	1500	3000	4300
Ghana	2500	2500	7500	10500	1200	1200	2400	3400
Ivory Coast	4800	4000	16000	22500	1500	1200	3600	5100
Mali	...	3000	15000	21500	820	800	2400	3400
Mauritania	-	4000	16000	22500	...	1000	3000	4300
Niger	-	4000	16000	22500	...	1000	3000	4300
Nigeria	3300	3000	9000	12500	1500	1500	3000	4300
Senegal	...	4000	16000	22500	1100	1000	3000	4300
Togo	-	4000	16000	22500	(230)	1000	3000	4300
Upper Volta	...	4000	12000	17000	...	1000	3000	4300
Central Africa								
Cameroon	3800	3000	12000	17000	1600	1600	3200	4600
Central African Republic	...	4000	12000	17000	1500	1500	3000	4300
Chad	-	4000	12000	17000	(1400)	1200	3600	5100
Congo (Brazzaville)	-	4000	12000	17000	(800)	1200	3600	5100
Cong (Kinshasa)	(1500)	3000	15000	21500	...	1200	3600	5100
Gabon	-	4000	12000	17000	1400	1400	2800	4000
East Africa								
Ethiopia	2000	2000	8000	11500	1600	1500	3000	4300
Kenya	3000	2500	7500	10500	(625)	1500	3000	4300
Madagascar	(5000)	4000	16000	22500	1500	1500	3000	4300
Malawi	...	2500	12500	17500	1400	1400	2800	4000
Tanzania	3000	2500	7500	10500	1700	1700	3400	4800
Uganda	3000	2500	7500	10500	(700)	1200	3600	5100
Zambia	...	2500	10000	14000	...	1500	3000	4300

1/ Most available data given (cols. 1 and 5) are for years between 1965 and 1967. Figures in brackets are known to be incomplete. All capital costs excluded.

2/ Undergraduate costs only (i.e. for first degree); no post-graduate training costs included.

3/ Wherever possible, applies only to 'certificate' level in English-speaking, and to '1st cycle secondary' level, in French-speaking countries.

4/ 'Figure used' multiplied by length of course in years.

5/ Increased to cover 30 per cent student wastage during training period (see text para. 43).

This table relates to text paras. 120-122.

121. Although there can be little comparability in the local data now available, they do indicate that university costs are generally higher in the French-speaking countries. It is not fully clear why this should be so. Whatever the accuracy of the estimated graduate costs used, they do serve to illustrate the high amount of annual and total investment represented by each individual graduate, especially when compared with the average gross domestic product per head of population, shown earlier in Table 7. These costs also further emphasize the urgent need to control numbers, to streamline training courses as much as possible, to reduce student wastage rates, and to make the maximum use of every person once trained.

122. It is strongly recommended that more attention be given to this type of costing in all countries. Annual cost per student provides a yardstick of the costs of running the training institutions, while cost per graduate shows what the total cost is to the country of each qualified person produced. To be of value, such costings must be accurate and complete. The practice followed in many countries of omitting the cost of personnel and equipment provided under technical assistance, gives a quite unrealistic and misleading picture of the true costs of training.

123. Total annual costs: Using the estimated costs per graduate (Table 8, columns 4 and 8) annual recurrent training costs have been calculated for each country for the annual outputs required, as shown in Table 6, columns 3 and 6. As stated above, all "senior" needs have been costed as university graduates, and all "field" personnel at the lower intermediate level. The total costs are given in Table 9, and are also expressed as a percentage of total GDP for 1975 and 1985. For this latter calculation, annual training outputs and costs have been kept constant.

124. This shows the small proportion of GDP which these training costs would absorb in the majority of these countries. While such costs can be expected to rise substantially by 1975 and more so by 1985, the proportion would still not be large. It will be noted that, in contrast to the total amounts, the proportions of GDP absorbed form a similar pattern to that commented on earlier when discussing total staff costs (paragraph 117) the amount varying roughly in inverse proportion to the total GDP per head of total population. The six countries with the highest percentage training costs (Dahomey, Mali, Niger, Upper Volta, Chad, Malawi) are all in the group with lowest GDP per head, the only apparent and partial exception here being Ethiopia. Again, there are no known "yardsticks" against which to compare and evaluate these data.

Table 9 : Africa south of the SaharaEstimated annual costs of training agricultural personnel

Sub-region, country	Senior level		Field level		Total cost	% GDP 1/	
	Output needed	Cost	Output needed	Cost		1975	1985
	2/	'000 \$	2/	'000 \$			
<u>West Africa</u>							
Dahomey	33	742	160	644	1386	0.602	0.407
Gambia	4	50	14	60	110	0.314	0.211
Ghana	80	840	180	612	1452	0.056	0.033
Ivory Coast	35	787	125	637	1424	0.087	0.050
Mali	85	1827	260	884	2711	0.063	0.423
Mauritania	16	360	45	193	553	0.204	0.138
Niger	70	1575	230	989	2564	0.683	0.457
Nigeria	850	10625	4200	18060	28685	0.404	0.234
Senegal	30	675	120	516	1191	0.116	0.078
Togo	20	450	75	322	772	0.406	0.270
Upper Volta	60	1020	200	860	1880	0.580	0.408
<u>Central Africa</u>							
Cameroon	65	1105	230	1058	2163	0.206	0.120
Central African Republic	20	340	50	215	555	0.228	0.140
Chad	60	1020	180	918	1938	0.646	0.435
Congo (Brazzaville)	8	136	12	61	197	0.083	0.056
Congo (Kinshasa)	180	3870	600	3060	6930	0.265	0.161
Gabon	4	68	10	40	108	0.027	0.016
<u>East Africa</u>							
Ethiopia	260	2990	1050	4515	7505	0.454	0.273
Kenya	100	1050	460	1978	3028	0.213	0.126
Madagascar	80	1800	265	1189	2939	0.274	0.162
Malawi	60	1050	270	1080	2130	0.887	0.568
Tanzania	145	1522	460	2208	3730	0.308	0.181
Uganda	100	1050	480	2448	3498	0.416	0.255
Zambia	40	560	140	602	1162	0.100	0.058

1/ Total gross domestic product - high variant.

2/ From Table 6, cols. 3 and 6.

This table relates to text paragraphs 123 et seq.

Training as a capital investment

125. Looking at training costs as a "human capital investment", the sums represented by the total agricultural personnel requirements for each country are considerable. Based on the estimated costs per graduate (Table 8) and using the 1975 agricultural personnel requirements from Appendix Table A/1, and the higher of the two 1985 estimates from Table 4, the total costs have been calculated up to 1975 and 1985. The figures are given in Table 10.

126. It should be noted that these "investment" costs are cumulative totals in each case. In Dahomey, for example, if the actual personnel employed on agricultural development by 1975 were to reach the estimated demand (in the proportions shown) for 1975, the total net sum invested over the intervening years in training these staff, would, it is estimated, amount to almost \$7 million by 1975. Again, if the numbers employed by 1985 reached the estimated needs at that year, the additional cost over the ten-year period would bring the total investment to approximately \$15 million.

127. It should be noted that, while these estimates are in some respects maximum costs, they do not allow for the normal staff wastage factor discussed earlier in this Chapter nor, of course, for probable cost increases between now and 1985. Taking staff wastage at 5 per cent, for example, means that for every 100 persons needed on the payroll in 1985, some 150 people in all have to be trained between now and 1985. This alone will tend to raise total costs very considerably.

128. By any standards, therefore, the expenditures involved are heavy, but planned expenditure on education and training in a scientific field such as modern agriculture, is one of the best investments a country could make. The size and urgency of the task ahead of the developing countries of Africa, and the limited resources available, make it all the more necessary to invest wisely, not only in adequate numbers but in the appropriate type and quality of training for their young people, to make them equal to the challenge now facing them.

Table 10 : Africa south of the Sahara

"Investment" represented by agricultural personnel required (in million US\$)

Sub-region country	By 1975 1/					By 1985 2/				
	Senior		Field		Total cost	Senior		Field		Total cost
	Nos.	Cost	Nos.	Cost		Nos.	Cost	Nos.	Cost	
					3/					3/
West Africa										
Dahomey	170	3.8	370	3.0	6.8	400	9.0	1800	6.1	15.0
Gambia	20	0.3	90	0.4	0.7	40	0.5	180	0.8	1.3
Ghana	300	3.2	1500	5.1	8.3	800	8.4	3400	11.6	20.0
Ivory Coast	200	4.5	1000	5.1	9.6	450	10.1	1600	8.2	18.3
Mali	300	6.5	1600	5.4	11.9	900	19.4	3200	10.9	30.3
Mauritania	70	1.6	350	1.4	3.0	120	4.0	600	2.6	6.6
Niger	300	6.8	1400	6.0	12.8	800	18.0	2700	11.6	29.6
Nigeria	3400	42.5	17000	73.0	115.5	9500	118.8	47000	202.0	320.8
Senegal	170	3.8	850	3.7	7.5	400	9.0	1500	6.5	15.5
Togo	90	2.0	460	2.0	4.0	200	4.5	900	3.9	8.4
Upper Volta	240	4.1	1200	5.2	9.3	600	10.2	2500	10.8	21.0
Central Africa										
Cameroun	300	5.1	1600	7.4	12.5	750	12.8	3000	13.8	26.6
Central African Republic	90	1.5	450	1.9	3.4	200	3.4	750	3.2	6.6
Chad	240	4.1	1200	6.1	10.2	600	10.2	2200	11.2	21.4
Congo (Brazzaville)	40	0.7	200	1.0	1.7	90	1.5	300	1.5	3.0
Congo (Kinshasa)	800	17.2	4000	20.4	37.6	2000	43.0	7000	35.7	78.7
Gabon	30	0.5	130	0.5	1.0	50	1.0	200	0.8	1.8
East Africa										
Ethiopia	1200	13.8	5000	24.9	38.7	3000	34.5	11000	47.3	81.8
Kenya	500	5.2	2600	11.2	16.5	1400	14.7	6000	25.8	40.5
Madagascar	400	9.0	2000	8.6	17.6	1000	22.5	3500	15.0	37.5
Malawi	260	4.6	1300	5.2	9.8	650	11.4	3300	13.2	24.6
Tanzania	600	6.3	3000	14.4	20.7	1600	16.3	6000	28.8	45.6
Uganda	500	5.3	2500	12.8	18.0	1300	13.7	5500	28.0	41.7
Zambia	160	2.2	300	3.4	5.6	400	5.6	1500	6.5	12.0

1/ Numbers required taken from 1975 column, Appendix Table A/1 (rounded figures).

2/ Numbers required are the higher of the two estimates given in Table 4 (rounded figures).

3/ Costs from costs/graduate in Table 3. Any errors due to rounding.

Appendix Table A/1.A
West Africa: - Agricultural population, farm families and requirements of trained agricultural personnel

	Dahomey		Gambia		Ghana		Ivory Coast		Mali		Mauritania	
	1975	1985	1975	1985	1975	1985	1975	1985	1975	1985	1975	1985
1. Agricultural population '000	2351	2884	338	391	5804	7195	3804	4465	4903	6212	985	1198
2. Av. no. persons per family	4.5		6.0		6.0		6.5		4.5		4.5	
3. Est. no. agricultural families '000	522	641	56	65	967	1200	585	687	1090	1380	219	266
4. No. families to have intensive services (1:500) 1/ '000												
1) by 1975	60		6		60		60		-		-	
2) by 1985 2/	378		36		672		69		-		-	
3) Balance at wider ratio. (1:1000) 3/	462	263	50	29	907	528	525	618	1090	1380	219	266
5. Field-level personnel required (intermediate level):												
(a) for extension work:												
1) at 1:500 families	120	756	12	72	120	1344	120	138	-	-	-	-
2) at 1:1000 families	462	263	50	29	907	528	525	618	1090	1380	219	266
3) extension sub-total	582	1019	62	101	1027	1872	645	756	1090	1380	219	266
(b) for non-extension work:												
4) other govt. services 4/	233	611	25	61	411	1123	258	454	436	828	88	160
5) commercial services 5/	58	204	6	20	103	374	64	151	109	276	22	53
6) non-extension sub-total	291	815	31	81	514	1497	322	605	545	1104	110	213
7) Total extn. + non-extn.	873	1834	93	182	1541	3369	967	1361	1635	2484	329	479
6. Senior supervisory/specialist personnel required: 6/												
(a) for extension work:												
1) in intensive areas	24	151	2	14	24	269	24	28	-	-	-	-
2) in other areas	92	53	10	6	181	105	105	123	218	276	44	53
3) extension sub-total	116	204	12	20	205	374	129	151	218	276	44	53
(b) for non-extension work:												
4) other govt. services	46	122	5	12	82	225	51	91	87	166	18	32
5) commercial services	12	41	1	4	21	75	13	30	22	55	4	11
6) non-extension sub-total	58	163	6	16	103	300	64	121	109	221	22	43
7) Total extn. + non-extn.	174	367	18	36	308	674	193	272	327	497	66	96
7. Total trained agricultural personnel: 5 (7) + 6 (7)	1047	2201	111	218	1849	4043	1160	1633	1962	2981	395	575

Appendix Table A/1.A (cont'd)

West Africa: Agricultural population, farm families and requirements of trained agricultural personnel

	Niger	Nigeria	Senegal	Togo	Upper Volta					
	1975	1985	1975	1985	1975	1985				
1. Agricultural population '000	3765	4813	58449	73070	2965	3535	1556	1993	5004	6090
2. No. of persons per family (Av.)	4.1	5.24	6.0	6.3	6.7	6.7				
3. Est. no. agricultural families '000	918	1174	11154	13944	494	589	247	316	747	909
4. No. families to have intensive services (1:500 1/ '000										
1) by 1975	-	240	60	60	60	60				
2) by 1985 2/	-	12410	218	196	491	491				
3) Balance at wider ratio (1:1000) 3/	918	1174	10914	1534	434	371	187	120	687	418
5. Field-level personnel required (intermediate level):										
a) for extension work:										
1) at 1:500 families	-	480	24820	120	436	120	392	120	982	982
2) at 1:1000 families	918	1174	10914	1534	434	371	187	120	687	418
3) extension sub-total	918	1174	11394	26354	554	807	307	512	807	1400
b) for non-extension work:										
4) other govt. services 4/	367	704	4558	15812	222	484	123	235	323	840
5) commercial services 5/	92	235	1139	5271	55	161	31	24	81	280
6) non-extension sub-total	459	939	5697	21083	277	645	154	259	404	1120
7) Total extn. + non-extn.	1377	2113	17091	47437	831	1452	461	771	1211	2520
6. Senior supervisory/specialist personnel required: 6/										
a) for extension work:										
1) in intensive areas	-	96	4964	24	87	24	78	24	196	196
2) in other areas	184	235	2183	307	87	74	37	24	137	84
3) extension sub-total	184	235	2279	5271	111	161	61	102	161	280
b) for non-extension work:										
4) other govt. services	73	141	911	3162	44	97	25	47	65	168
5) commercial services	18	47	228	1054	11	32	6	5	16	56
6) non-extension sub-total	91	188	1139	4216	55	129	31	52	81	224
7) Total extn. + non-extn.	275	423	3418	9487	166	290	92	154	242	504
7. Total trained agricultural personnel: 5 (7) + 6 (7)	1652	2536	20509	56924	997	1742	553	925	1453	3024

Appendix Table A/1.B

Central Africa : Agricultural population, farm families and requirements of trained agricultural personnel

	Cameroon		Central African Republic		Chad		Congo (Brazzaville)		Congo (Kinshasa)		Gabon	
	1975	1985	1975	1985	1975	1985	1975	1985	1975	1985	1975	1985
1. Agricultural population '000	4882	5661	1186	1269	3673	4320	582	635	11963	13361	385	385
2. Av. no. persons per family	5.0		4.0		4.6		4.7		4.5		4.6	
3. Est. no. agricultural families '000	976	1132	296	317	798	939	124	135	2658	2969	84	84
4. No. families to have intensive services (1:500) 1/ '000	60		-		-		-		60		-	
1) by 1975												
2) by 1985 2/	589		-		-		-		356		-	
3) Balance at wider ratio (1:1000) 3/	916	543	296	317	798	939	124	135	2598	2613	84	84
5. Field-level personnel required (intermediate level):												
a) } for extension work:												
1) } at 1:500 families	120	1178	-	-	-	-	-	-	120	712	-	-
2) } at 1:1000 families	916	543	296	317	798	939	124	135	2598	2613	84	84
3) } extension sub-total	1036	1721	296	317	798	939	124	135	2718	3325	84	84
b) } for non-extension work:												
4) } other govt. services 4/	414	1033	118	190	319	563	50	81	1087	1995	34	50
5) } commercial services 5/	104	344	30	63	80	188	12	27	272	665	8	17
6) } non-extension sub-total	518	1377	148	253	399	751	62	108	1359	2660	42	67
7) Total extn. + non-extn.	1554	3098	444	570	1197	1690	186	243	4077	5985	126	151
6. Senior supervisory/specialist personnel required: 6/												
a) } for extension work:												
1) } in intensive areas	24	235	-	-	-	-	-	-	24	142	-	-
2) } in other areas	183	109	59	63	160	188	25	27	520	523	17	17
3) } extension sub-total	207	344	59	63	160	188	25	27	544	665	17	17
b) } for non-extension work:												
4) } other govt. services	83	207	24	38	64	113	10	16	217	399	7	10
5) } commercial services	21	69	6	13	16	38	2	5	54	133	1	3
6) } non-extension sub-total	104	276	30	51	80	151	12	21	271	532	8	13
7) Total extn. + non-extn.	311	620	89	114	240	339	37	48	815	1197	25	30
7. Total trained agricultural personnel: 5 (7) + 6 (7)	1865	3718	533	684	1437	2029	223	291	4892	7182	151	181

Appendix Table A/1.C

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East Africa : Agricultural population, farm families and requirements of trained agricultural personnel

	Ethiopia		Kenya		Madagascar		Malawi		Tanzania		Uganda		Zambia	
	1975	1985	1975	1985	1975	1985	1975	1985	1975	1985	1975	1985	1975	1985
1. Agricultural population '000	22836	26015	9868	12411	5958	6682	3971	4946	12161	14710	8048	9434	3626	4385
2. No. of persons per family	6.		6.		4.7		5.		6.		5.		7.	
3. Est. no. of agricultural families '000	3806	4335	1644	2068	1268	1422	794	989	2027	2452	1609	1887	518	626
4. No. of families to have intensive services - (i.e. 1:500) 1/'000	60		60		60		60		60		60		-	-
1) by 1975	-	1864	-	1282	-	412	-	821	-	588	-	1189	-	-
2) by 1985 2/														
3) Balance at normal ratio (i.e. 1:1000) 3/	3746	2471	1584	786	1208	1010	734	168	1967	1864	1549	698	518	626
5. Field services personnel required (intermediate level):														
a) for extension work:														
1) at 1:500 families	120	3728	120	2564	120	824	120	1642	120	1176	120	2378	-	-
2) at 1:1000 families	3746	2471	1584	786	1208	1010	734	168	1967	1864	1549	698	518	626
3) extension sub-total	3866	6199	1704	3350	1328	1834	854	1810	2087	3040	1669	3076	518	626
b) for non-extension work:														
4) other govt. services 4/	1546	3719	682	2010	531	1100	342	1086	835	1824	668	1846	207	376
5) commercial services 5/	387	1240	170	670	133	367	85	362	209	608	167	615	52	125
6) non-extension sub-total	1933	4959	852	2680	664	1467	427	1448	1044	2432	835	2461	259	501
7) Total extn. + non-extn.	5799	11158	2556	6030	1992	3301	1281	3258	3131	5472	2504	5537	777	1127
6. Senior supervisory/specialist personnel required: 6/														
a) for extension work:														
1) in intensive areas	24	746	24	513	24	165	24	328	24	235	24	476	-	-
2) at "normal" levels	749	494	317	157	242	202	147	34	393	373	310	140	104	125
3) extension sub-total	773	1240	341	670	266	367	171	362	417	608	334	616	104	125
b) for non-extension work:														
4) other govt. services	309	744	136	402	106	220	68	217	167	365	134	369	41	75
5) commercial services	77	248	34	134	27	73	17	72	42	122	33	123	11	25
6) non-extension sub-total	386	992	170	536	133	293	85	289	209	487	167	492	52	100
7) Total extn. + non-extn.	1160	2232	511	1206	399	660	256	652	626	1095	501	1108	155	225
7. Total trained agricultural personnel 5 (7) + 6 (7)	6959	13390	3067	7236	2391	3961	1537	3910	3757	6567	3005	6645	933	1352

Footnotes for Appendix Tables A/1.A, B and C

- 1/ See text Table 2 for details.
- 2/ All 1985 figures include those for 1975.
- 3/ See text, para. 14.
- 4/ Taken as 40 per cent of extension sub-total (5.a.3) for 1975, and as 60 per cent for 1985.
- 5/ Taken as 10 per cent of extension sub-total (5.a.3) for 1975, and as 20 per cent for 1985.
- 6/ Calculated throughout on ratio of 1:5 field-level personnel.

Tables A/1.A, B and C relate to text, paras. 9-19.

Appendix

11/ Cumulative totals, i.e., inclusive of the 1975 figures.

Table A/2 (cont'd)

Sub-region, country	Project areas	Agricultural personnel required					Home Econ.		Co-op				
		Farm			Total	personnel	societies	personnel					
		1	2	3					4	5	6	7	
Type Nos.	Senr.Field	Senr.Field	Youth work	Senr.Field	Senr.Field	Senr.Field	Senr.Field	Senr.Field	Senr.Field	Senr.Field			
By 1985 1/(cont'd)													
Nigeria													
(i)	2068	4136	24816	-	2068	4136	10340	8272	37224	2068	4136	2068	45496
(ii)	511	511	1533	-	511	511	1533	1022	3577	511	511	511	5110
Total	2579	4647	26349	-	2579	4647	11873	9294	40801	2579	4647	2579	50606
Senegal													
(i)	36	72	432	-	36	72	180	144	648	36	72	36	792
(ii)	124	124	372	-	124	124	372	248	868	124	124	124	1240
Total	160	196	804	-	160	196	552	392	1516	160	196	160	2032
Upper Volta													
(i)	82	164	984	-	82	164	410	328	1476	82	164	82	1804
(ii)	139	139	417	-	139	139	417	278	973	139	139	139	1390
Total	221	303	1401	-	221	303	827	606	2443	221	303	221	3194
Togo													
(i)	33	66	396	-	33	66	165	132	594	33	66	33	726
(ii)	40	40	120	-	40	40	120	80	280	40	40	40	400
Total	73	106	516	-	73	106	285	212	874	73	106	73	1126
Central Africa													
By 1975:													
Cameroon													
(i)	10	20	120	-	10	20	50	40	180	10	20	10	220
(i)	10	20	120	-	10	20	50	40	180	10	20	10	220
(ii)	10	10	30	-	10	10	30	20	70	10	10	10	100
By 1985: 1/													
Cameroon													
(i)	98	196	1176	-	98	196	490	392	1764	98	196	98	2156
(ii)	181	181	543	-	181	181	543	362	1267	181	181	181	1810
Total	279	377	1719	-	279	377	1033	754	3031	279	377	279	3966
Central African Republic													
(i)	106	106	318	-	106	106	318	212	742	106	106	106	1060
(ii)	106	106	318	-	106	106	318	212	742	106	106	106	1060
Chad													
(i)	313	313	939	-	313	313	939	626	2191	313	313	313	3130
(ii)	313	313	939	-	313	313	939	626	2191	313	313	313	3130
Congo (Brazzaville)													
(i)	45	45	135	-	45	45	135	90	315	45	45	45	450
(ii)	45	45	135	-	45	45	135	90	315	45	45	45	450
Total	45	45	135	-	45	45	135	90	315	45	45	45	450

1/ Cumulative totals, i.e., inclusive of the 1975 figures.

Table A/2 (cont'd)

Sub-region, country	Project areas	Agricultural personnel required										Co-op		
		Farm										societies		
		Agric.Extn. Youth work services										personnel		
		Type Nos.	Senr.	Field	Senr.	Field	Senr.	Field	Senr.	Field	Senr.	Field		
By 1985 1/ (cont'd)	1	2	3	4	5	6	7							
Congo (Kinshasa)	(i)	59	118	708	-	59	118	295	236	1062	59	118	59	1298
	(ii)	871	871	2613	-	871	871	2613	1742	6097	871	871	871	8710
Total		930	989	3321	-	930	989	2908	1978	7159	930	989	930	10008
Gabon	(i)	-	-	-	-	-	-	-	-	-	-	-	-	-
	(ii)	28	28	84	-	28	28	84	56	196	28	28	28	280
Total		28	28	84	-	28	28	84	56	196	28	28	28	280
East Africa														
By 1975														
Kenya	(i)	10	20	120	-	10	20	50	40	180	10	20	10	220
	(ii)	10	10	30	-	10	10	30	20	70	10	10	10	100
	(iii)	10	10	30	-	10	10	30	20	70	10	10	10	100
All others	(i)	10	10	120	-	10	20	50	40	180	10	20	10	220
By 1985 1/														
Ethiopia	(i)	311	622	3732	-	311	622	1555	1244	5598	311	622	311	6842
	(ii)	824	824	2472	-	824	824	2472	1648	5768	824	824	824	8240
Total		1135	1446	6204	-	1135	1446	4027	2892	11366	1135	1446	1135	15082
Kenya	(i)	214	428	2568	-	214	428	1070	856	3852	214	428	214	4708
	(ii)	262	262	786	-	262	262	786	524	1834	262	262	262	2620
Total		476	690	3354	-	476	690	1856	1380	5686	476	690	476	7328
Madagascar	(i)	69	138	828	-	69	138	35	276	1242	69	138	69	1518
	(ii)	337	337	1011	-	337	337	1011	674	2359	337	337	337	3370
Total		406	475	1839	-	406	475	1356	950	3601	406	475	406	4888
Malawi	(i)	137	274	1644	-	137	274	605	548	2466	137	274	137	3014
	(ii)	56	56	168	-	56	56	168	112	392	56	56	56	560
Total		193	330	1812	-	193	330	853	660	2858	193	330	193	3574
Tanzania	(i)	98	196	1176	-	98	196	490	392	1764	98	196	98	2156
	(ii)	621	621	1863	-	621	621	1863	1242	4347	621	621	621	6210
Total		719	817	3039	-	719	817	2353	1634	6111	719	817	719	8366

1/ Cumulative totals, i.e., inclusive of the 1975 figures.

Table A/2 (cont'd)

Sub-region, country	Project areas Type Nos.	Agricultural personnel required						
		Agric. personnel required					Co-op societies personnel	
		1	2	3	4	5	6	7
By 1985, 1/ (cont'd)								
Uganda	(i)	198	396	2376	-	198	396	198
	(ii)	233	233	699	-	233	233	233
	Total	431	629	3075	-	431	629	431
Zambia	(i)	-	-	-	-	-	-	-
	(ii)	209	209	627	-	209	209	209
	Total	209	209	627	-	209	209	209

1/ Cumulative totals, i.e., inclusive of the 1975 figures.

Appendix Table A/3 : Africa south of the Sahara

Trained agricultural personnel : Estimated availability^{1/} in relation to requirements of agricultural services

Sub-region, country	Base year nos. in service			1975			1985		
	Senr.	Field	Total	Senr.	Field	Total	Senr.	Field	Total
WEST AFRICA									
Dahomey									
Nos. available	53	204	257	33	366	399	20	475	495
Nos. required				174	873	1047	367	1834	2201
Surplus/Deficit				-141	-507	-648	-347	-1359	-1706
Gambia									
Nos. available	7	34	41	4	94	98	3	137	140
Nos. required				18	93	111	36	182	218
Surplus/Deficit				-14	+1	-13	-33	-45	-78
Ghana									
Nos. available	...	...	...	599	1324	1923	1009	2229	3238
Nos. required				308	1541	1849	674	3369	4043
Surplus/Deficit				+291	-217	+74	+335	-1140	-805
Ivory Coast									
Nos. available	294	580	874	281	845	1126	377	1029	1406
Nos. required				193	967	1160	272	1361	1633
Surplus/Deficit				+88	-122	-34	+105	-332	-227
Mali									
Nos. available	69	685	754	104	1204	1308	175	1516	1691
Nos. required				327	1635	1962	497	2484	2981
Surplus/Deficit				-223	-431	-654	-322	-968	-1290
Mauritania									
Nos. available	34	287	321	19	335	354	12	362	374
Nos. required				66	329	395	96	479	575
Surplus/Deficit				-47	+6	-41	-84	-117	-201
Niger									
Nos. available	51	412	463	32	769	801	19	1133	1152
Nos. required				275	1377	1652	423	2113	2536
Surplus/Deficit				-243	-608	-851	-404	-980	-1384
Nigeria									
Nos. available	254	2851	3105	1277	6515	7792	1976	9020	10996
Nos. required				3418	17091	20509	9487	47437	56924
Surplus/Deficit				-2141	-10576	-12717	-7511	-38417	-45928
Senegal									
Nos. available	85	521	606	180	757	937	244	919	1163
Nos. required				166	831	997	290	1452	1742
Surplus/Deficit				+14	-74	-60	-46	-533	-579
Togo									
Nos. available	23	194	217	14	229	243	9	330	339
Nos. required				92	461	553	154	771	925
Surplus/Deficit				-78	-232	-310	-145	-441	-586

(Appendix Table A/3-cont'd.)

Sub-region, Country	Base year nos. in service			1975			1985		
	Senr.	Field	Total	Senr.	Field	Total	Senr.	Field	Total
<u>WEST AFRICA (Cont'd)</u>									
<u>Upper Volta</u>									
Nos. available	52	479	531	113	650	763	292	767	1059
Nos. required				242	1211	1453	504	2520	3024
Surplus/Deficit				-129	-561	-690	-212	-1753	-1965
<u>CENTRAL AFRICA</u>									
<u>Cameroon</u>									
Nos. available	163	884	1047	192	1533	1725	211	1978	2189
Nos. required				311	1554	1865	620	3098	3718
Surplus/Deficit				-119	-21	-140	-409	-1120	-1529
<u>Centr. African Rep.</u>									
Nos. available	38	379	417	93	428	521	209	457	666
Nos. required				89	444	533	114	570	684
Surplus/Deficit				+4	-16	-12	+95	-113	-18
<u>Chad</u>									
Nos. available	38	499	537	44	699	743	82	835	917
Nos. required				240	1197	1437	339	1690	2029
Surplus/Deficit				-196	-498	-694	-257	-855	-1112
<u>Congo Brazzaville</u>									
Nos. available	28	287	315	18	588	606	11	793	804
Nos. required				37	186	223	48	243	291
Surplus/Deficit				-19	+402	+383	-37	+550	+513
<u>Congo (Kinshasa)</u>									
Nos. available	68	1085	1153	235	3629	3864	406	6088	6494
Nos. required				815	4077	4892	1197	5985	7182
Surplus/Deficit				-580	-448	-1028	-791	+103	-688
<u>Gabon</u>									
Nos. available	31	174	205	20	147	167	12	128	140
Nos. required				25	126	151	30	151	181
Surplus/Deficit				-5	+21	+16	-18	-23	-41
<u>EAST AFRICA</u>									
<u>Ethiopia</u>									
Nos. available	30	143	173	581	1073	1654	957	1710	2667
Nos. required				1160	5799	6959	2232	11158	13390
Surplus/Deficit				-579	-4726	-5305	-1275	-9448	-10723
<u>Kenya</u>									
Nos. available	123	2080	2203	217	2738	2955	283	3188	3471
Nos. required				511	2556	3067	1206	6030	7236
Surplus/Deficit				-294	+182	-112	-923	-2842	-3765
<u>Madagascar</u>									
Nos. available	127	1563	1690	243	1621	1864	322	1661	1983
Nos. required				399	1992	2391	660	3301	3961
Surplus/Deficit				-156	-371	-527	-338	-1640	-1978

(Appendix Table A/3 cont'd)

Sub-region, country	Base Year nos. in service			1975			1985		
	Senr.	Field	Total	Senr.	Field	Total	Senr.	Field	Total
<u>EAST AFRICA (Cont'd)</u>									
<u>Malawi</u>									
Nos. available	26	390	416	120	1303	1423	184	1928	2112
Nos. required				256	1281	1537	652	3258	3910
Surplus/Deficit				-136	+22	-114	-468	-1330	-1798
<u>Tanzania</u>									
Nos. available	110	1977	2087	209	3331	3540	278	4257	4535
Nos. required				626	3131	3757	1095	5472	6567
Surplus/Deficit				-417	+200	-217	-817	-1215	-2032
<u>Uganda</u>									
Nos. available	54	463	517	174	1187	1361	257	1682	1939
Nos. required				501	2504	3005	1108	5537	6645
Surplus/Deficit				-327	-1317	-1644	-851	-3855	-4706
<u>Zambia</u>									
Nos. available	75	846	921	177	1546	1723	387	2025	2412
Nos. required				156	777	933	225	1127	1352
Surplus/Deficit				+21	+769	+790	+162	+898	+1060

1/ So far as known, agricultural research, fisheries and forestry personnel and veterinarians have been excluded.

Table relates to text, para. 34.

Table A/4 : Africa south of the Sahara

Trained agricultural personnel; effect of availability (a) on number of COE projects possible, and (b) on farm families covered by projects by 1985

Sub-region country	Concentration of effort projects, 1985				No. agricultural families in COE projects, 1985			
	Total, projects required: type		Nos. possible with total personnel available: type		Total no. families 1985	With total personnel available, no. families covered in types:		
	(i)	(ii)	(1)	(ii)		(i)	(ii)	All %
	11/				2/		1000	
West Africa								
Dahomey	63	88	22	-	641	132	-	132 21
Gambia	6	10	6	1	65	36	3	39 60
Ghana	112	176	112	86	1200	672	258	930 78
Ivory Coast	12	206	12	126	687	72	378	450 66
Mali	-	460	-	188	1380	-	564	564 41
Mauritania	-	89	-	42	266	-	126	126 47
Niger	-	391	-	128	1174	-	384	384 33
Nigeria	2068	511	500	-	13944	3000	-	3000 22
Senegal	36	124	36	41	589	216	123	339 58
Togo	33	40	15	-	316	90	-	90 28
Upper Volta	82	139	48	-	909	288	-	288 32
Central Africa								
Cameroon	98	181	98	3	1132	588	9	597 53
Central African Republic	-	106	-	74	317	-	222	222 70
Chad	-	313	-	102	939	-	306	306 33
Congo (Brazzaville)	-	45	-	45	135	-	135	135 100
Congo (Kinshasa)	59	871	59	577	2969	354	1731	2085 70
Gabon	-	28	-	15	84	-	45	45 54
East Africa								
Ethiopia	311	824	121	-	4335	726	-	726 17
Kenya	214	262	158	-	2068	948	-	948 46
Madagascar	69	337	69	50	1422	414	150	564 38
Malawi	137	56	96	-	989	576	-	576 58
Tanzania	98	621	98	264	2452	588	792	1380 56
Uganda	198	233	88	-	1887	528	-	528 28
Zambia	-	209	-	209	626	-	626	626 100

1/ From text Table 3.

2/- From text Table 1.

This table relates to the text, paragraph 36.