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Statistical Brief on the National Agricultural Research System
of
KENYA

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ISNAR INDICATOR SERIES PROJECT: PHASE II
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ISNAR INDICATOR SERIES PROJECT PHASE II

Decision making in the agricultural research policy area in either domestic, regional, or international fora can only be aided by access to reliable and comprehensive data on these systems. It is for this reason that ISNAR initiated its Indicator Series Project in 1986. The major objective of this project is to collect, process, and analyze reliable and comprehensive time-series data on national agricultural research systems (NARSs) throughout the world in order to identify and report on major trends and emerging policy issues with regard to the development of NARSs. To this end a database has been developed that contains time-series data on agricultural research expenditures and personnel for more than 150 developing and developed countries. These data provide a quantitative basis for more in-depth research policy studies by ISNAR and others.

During the first phase of the project (1986-91), the Indicator Series project team produced two major publications published by Cambridge University Press, namely:

Pardey, P.G., and J. Roseboom. (1989) *ISNAR Agricultural Research Indicator Series: A Global Data Base on National Agricultural Research Systems*, 547 pp.; and

Pardey, P.G., J. Roseboom, and J.R. Anderson, eds. (1991) *Agricultural Research Policy: International Quantitative Perspectives*, 462 pp..

The first publication is a statistical reference volume that provides system-level data on agricultural research personnel and expenditures for 154 countries. The second publication draws on the database to report on the major policy dimensions of agricultural research, with a primary focus on less-developed countries.

Phase II of the Indicator Series Project was initiated in 1992 and seeks to update the database and the policy analyses that accompany it. New ISNAR survey data are being used in conjunction with a large variety of published and "informal" reports in order to produce reliable as well as up-to-date information and statistics about the NARSs.

The country-level data are being published in a series of NARS Statistical Briefs. These briefs include more detailed descriptive information about the institutional structure of the NARS as well as a more comprehensive set of statistics than were reported in the 1989 Indicator Series volume. It is envisaged the country-level data will be assembled and analyzed in a series of regional research reports.

These statistical briefs are not official ISNAR publications; they are not edited or reviewed by ISNAR. The information and data presented have been collected and compiled with due care and all reasonable efforts have been made to ensure their accuracy. Comments, corrections, and additions to the material reported in this brief are welcomed. These briefs may be cited with due acknowledgment.

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Acronyms

CGIAR	Consultative Group on International Agricultural Research	ISNAR	International Service for National Agricultural Research
CRF	Coffee Research Foundation	JKUCAT	Jomo Kenyatta University College of Agriculture and Technology
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo	KARI	Kenya Agricultural Research Institute
DB	Department of Botany	KEFRI	Kenya Forestry Research Institute
DZ	Department of Zoology	KETRI	Kenya Trypanosomiasis Research Institute
EAAFRO	East African Agriculture and Forestry Research Organization	KEMFRI	Kenya Marine and Fisheries Research Institute
EAVRO	East African Veterinary Research Organization	KU	Kenyatta University
EU	Egerton University	MNR	Ministry of Natural Resources
FA	Faculty of Agriculture	MOA	Ministry of Agriculture
FASS	Faculty of Arts and Social Sciences	MTWL	Ministry of Tourism and Wild Life
FFRWM	Faculty of Forestry Resources and Wildlife Management	MU	Moi University
FS	Faculty of Science	NARP	National Agricultural Research Project
FTE	Full-Time Equivalent	NARS	National Agricultural Research System
FVS	Faculty of Veterinary Sciences	NCST	National Council for Science and Technology
ICARDA	International Center for Agricultural Research in Dry Areas	NIB	National Irrigation Board
ICIPE	International Center of Insect Physiology and Ecology	PPP	Purchasing Power Parities
ICRAF	International Centre for Research in Agroforestry	SES	School of Environmental Studies
IDS	Institute of Development Studies	SRD	Scientific Research Department
ILCA	International Livestock Centre for Africa	TRFK	Tea Research Foundation of Kenya
ILRAD	International Laboratory for Research on Animal Diseases	TRIEA	Tea Research Institute of East Africa
		VRD	Veterinary Research Department
		UN	University of Nairobi

1. Introduction

The primary purpose of this brief is to provide statistical and institutional details on the development and current status of the public agricultural research system in Kenya. This information has been collected and presented in a systematic way in order to inform and thereby improve research policy formulation with regard to the Kenyan NARS. Most importantly, these data are assembled and reported in a way that makes them directly comparable with the data presented in the other country briefs in this series. And because institutions take time to develop and there are often considerable lags in the agricultural research process, it is necessary for many analytical and policy purposes to have access to longer-run series of data.

NARSs vary markedly in their institutional structure and these institutional aspects can have a substantial and direct effect on their research performance. To provide a basis for analysis and cross-country, over-time comparisons, the various research agencies in a country have been grouped into five general categories; government, semi-public, private, academic, and supranational. A description of these categories is provided in table 1.

Table 1: *Institutional Categories*

Category	Description	Examples
Government	Agencies directly administered by government.	Research department within a ministry
Semi-public	Agencies not directly controlled by government and with no explicit profit making objective.	Research institute under a commodity board
Private	Agencies whose primary activity is the production of goods and services for profit.	Agricultural machinery or chemical company
Academic	Agencies that combine university-level education with research.	Faculty of agriculture
Supranational	Agencies whose mandate covers more than one country.	CGIAR institutes

Note: Adapted from OECD (1981).

The concept of a NARS used throughout this report includes only those institutes that can be classified as government, semi-public, and academic agencies. Where it is useful to do so, private and supranational research agencies have been discussed, but for reasons of comparability they are not included in the NARS data reported here. More detailed information on the definitions and concepts used in this brief is provided in appendix 2.

Section 2 provides a brief description of the institutional development and current structure of the NARS. Section 3 presents a statistical overview of the longer-run investment trends in agricultural research along with a more detailed look at contemporary investment orientations. The appendices provide further descriptive details and present the basic research personnel and expenditure data in disaggregated fashion. For general background information and statistics on Kenya we refer to appendix 1.

2. Agricultural Research Institutions

2.1 Historical Evolution¹

Agricultural research in Kenya was formalized in 1903 when the Department of Agriculture of the colonial government established the first of its agricultural experiment stations at a government farm at Kabete, located three miles west of Nairobi. Between 1903 and 1924 a government entomologist, a tobacco officer, a coffee planting inspector, a horticulturalist, a plant breeder, a government mycologist and an agricultural chemist were appointed to the station. In 1924 the staff were transferred to a new facility called Scott (now National) Agricultural Laboratories. Veterinary Research Laboratories were also set up at Kabete in 1908. In these early days of agricultural research, the focus was primarily on the production problems of the European settlers. As crop and animal production grew in economic importance and settlers spread over the country, several other agricultural research stations were established.²

After World War II the development of the agricultural research system gained momentum. Until this time the responsibility for agricultural research had been with the local colonial government. The new development strategy formulated by the British government during World War II included a more active role by the British government in the promotion of science and technology in its colonies. These policy reforms led to the creation of several regional agricultural research organizations in East Africa that complemented or partially replaced existing research institutes. These organizations were mainly financed by the British government and included: the East African Agriculture and Forestry Research Organization (established in 1948) and the East African Veterinary Research Organization (1946), in Kenya; the East African Freshwater Fisheries Research Organization (1947) and the East African Trypanosomiasis Research Organization (1948), in Uganda; and the East African Marine Fisheries Research Organization (1952) and the Tropical Pesticides Research Institute of East Africa (1952), in Tanzania. In addition, the East African Agricultural and Forestry Research Council was created in 1947 with a mandate to monitor all of the research carried out by the territorial and interterritorial institutes of Kenya, Tanganyika, Uganda, and Zanzibar. The Council was headquartered in Nairobi.

In 1949, coffee research was transferred from the Agricultural Laboratories at Kabete to the newly established Coffee Research Station at Ruiru with the aid of a Colonial Development and Welfare grant. To help finance the work at this station a producer-sponsored agency, the Coffee Research Foundation (CRF), was established in that same year.³ Also in 1949 the Tea Research Institute of East Africa (TRIEA) was established, taking over the Research Department of the East African Tea Holdings based at Kericho. Both institutes were, and still are, primarily financed through a tax on these products collected by the respective commodity boards. While other commodity boards or grower associations for commodities like sisal, cotton, pineapple, and pyrethrum did not establish autonomous research institutes, they did provide funds for research executed by the Department of Agriculture. A significant expansion of the Department of Agriculture's network of research stations took place between 1945 and 1963, the year of

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1. This section draws largely from East Africa Academy (1966), Thairu (1980), ISNAR (1981), Jamieson (1981), Muturi (1981), Wang'ati (1981), Wapakala (1986), and Ruttan (1987).
 2. A plant breeding station was established at Njoro in 1927, animal husbandry research stations at Naivasha and Mariakana in 1928 and 1932, respectively, and a sisal research station at Thika in 1937.
 3. In 1964 the Kenyan government assigned full responsibility for executing coffee research to this foundation.

independence. Experiment stations were established in hitherto neglected areas of the country in which African farmers predominated. For the first time, the problems of the local farmers were given some serious attention by the country's research agencies.

What evolved in Kenya during the pre-independence decades was a dualistic organizational structure consisting primarily of a ministry-based national network of research stations, largely managed and financed locally, along with a series of regionally mandated institutes that were primarily directed and funded by the metropolitan government. These latter institutes were discipline-based operations largely providing specialist research services to all three countries constituting the East African Community. Thus the virologists, soil physicists, and the like working at EAAFRO complemented the more site-specific work of the breeders, agronomists, entomologists and so on in the local institutes. Likewise, the scientists at EAVRO tended to work in-depth on a selected number of diseases or research problems rather than on issues of a more general veterinary nature.

With independence in December 1963, all the national agricultural research agencies were transferred, with few disruptions, to the newly independent government while the regional research organizations continued with little change in their operational status. Initially the British government maintained its core contribution to the regional research organizations, but this was phased out in the latter half of the 1960s and replaced by project-based funding arrangements. At the same time, other donors like USAID and the Rockefeller Foundation became more important.

While few African Kenyans had been trained as agricultural researchers at independence, many British researchers continued to work in Kenya for some years following independence. Over time increasing numbers of Kenyans received graduate training in the agricultural sciences, with many initially going to British and American universities as well as Makerere University College in Uganda. Gradually the British researchers were replaced by Kenyan researchers, and also by expatriate researchers from countries other than Britain as donor support to agricultural research became more diversified.

During the first 10 to 15 years after independence there were few changes in the organizational setup of the agricultural research system other than some expansion of the network of experiment stations. Most national agricultural research was conducted by the Department of Agriculture⁴ and the Veterinary Services Department of the Ministry of Agriculture. Research on coffee and tea was conducted by CRF and TRIEA respectively, while some major research projects on irrigation were conducted under the supervision of the National Irrigation Board. Forestry research, although limited, was conducted by the Forest Department of the Ministry of Natural Resources and fisheries research by the Fisheries Department of the Ministry of Tourism and Wildlife. As mentioned earlier, the East African agricultural research organizations, of which two were headquartered in Kenya, continued operating with little change in their research programs during this post-independence period. Also the East African Agricultural and Forestry Research Council continued in its role as a regional coordinator.

4. In 1974, all the crop and livestock research scattered throughout the various divisions within the Department of Agriculture were brought together within a Scientific Research Division. Veterinary research, however, remained under the Veterinary Services Department. In 1979, crop and livestock research were again separated when the ministry was divided into a Ministry of Agriculture and a Ministry of Livestock Development. In 1983 the two ministries were reunited, only to be divided again in 1986.

In 1968, the Kenyan government formed an Agricultural Research Survey Team to review the research activities of the Ministry of Agriculture. The team noted many deficiencies and made wide-ranging recommendations. Although few of the recommendations were implemented, the Ministry of Agriculture did follow through on one of the recommendations and established an Agricultural Research Advisory Council. But apart from an inaugural meeting in 1969, the council never became operational (Wapakala 1986).

With the collapse of the East African Community in 1977, the regional agricultural research organizations were dissolved and their operations taken over by the countries in which they were located. Kenya inherited EAAFRO and EAVRO but lost direct access to the specialized research organizations located in Tanzania and Uganda. This new situation led to a serious rethinking of the conduct and structure of the Kenyan agricultural research system. The lead on these issues was taken by the National Council for Science and Technology, which had just been established under the Science and Technology Act of 1977 to advise the government on all aspects of science and technology. The council advised the government to reorganize agricultural research into a number of semi-autonomous parastatal institutes. A Science and Technology (Amendment) Act, which made provisions for the establishment of these semi-autonomous research institutes, was passed in 1979.⁵

Under the provisions of this new act, the Kenya Agricultural Research Institute (KARI) was established as a semi-autonomous research institution under the Ministry of Agriculture. KARI was expected to combine the research services of the Ministry of Agriculture and the Ministry of Natural Resources with those of the former East African Community. Initially, however, only the research activities, staff, and infrastructure of EAAFRO and EAVRO were transferred to KARI, better known as KARI-Muguga to distinguish it from the present KARI. The new institute comprised four research departments which focussed respectively on crops, livestock, forestry, and animal diseases. The integration of the research components of the respective ministries into KARI did not take place until the second half of the 1980s. However, before the completion of this merger, forestry research was moved in 1985 into a separate institute, the Kenyan Forestry Research Institute (KEFRI). Also under the provision of the Science and Technology Act the Kenyan Marine and Fisheries Research Institute (KEMFRI) and the Kenyan Trypanosomiasis Research Institute (KETRI) were established in 1979, both taking over some scattered research activities formerly linked to the respective East African Research Organizations that were located in Tanzania and Uganda.

Although the Tea Research Institute of East Africa (TRIEA) was not formally part of the East African Community, the collapse of the Community eventually also affected this institute. In 1980 it was transformed into the Tea Research Foundation of Kenya (TRFK). In this process the institute lost its two research stations in Uganda and Tanzania as well as the financial support of the Ugandan and Tanzanian tea industry.

5. This act also provided for the establishment of Advisory Research Committees (ARCs) in each of the major areas of science. These committees fall directly under the jurisdiction of the National Council for Science and Technology (NCST), the highest policymaking body in the country for Science and Technology. The ARCs are the institutional means by which the technical ministries and the research agencies are linked. The ARCs serve primarily as forums for the establishment of research programs and budget allocations. They are also concerned with the quality and efficiency of the scientific research that comes under their review. In the agricultural sector this responsibility lies with the Agricultural Sciences Advisory Research Committee (Muturi 1981).

At independence, there were no academic institutions in the agricultural sciences operating in Kenya. The only institute at that time providing graduate and post-graduate training in the agricultural sciences in the East African Community was the Makerere University College in Uganda. Diploma-level training in Kenya was offered at Egerton Agricultural College, which was established in 1939 and initially only admitted Europeans. Since the College had been granted a considerable amount of agricultural land by Lord Egerton, it had a long tradition of running demonstration trials on its farms. However, the College did not have an explicit research mandate until it was upgraded to university status in 1986. This was followed by a broadening of Egerton University's mandate to include a more comprehensive set of disciplines beyond the agricultural sciences. Graduate training in the veterinary sciences was initiated in 1962 at the University College of Nairobi, which originally had close links with the University of London. In 1970 the College was upgraded to university status and became the University of Nairobi. In this process the Department of Veterinary Sciences was upgraded to faculty status. A Faculty of Agriculture was also established in 1970 within the University of Nairobi. Both faculties undertake research. In addition, the Institute of Development Studies (established in 1965) and the Departments of Botany and Zoology (established in 1962) of the Faculty of Science of the University of Nairobi do some research that is of relevance to agriculture.

The academic sector expanded further in 1984 when Moi University was established. It assumed the forestry section of the Faculty of Agriculture and Forestry of the University of Nairobi to establish the Faculty of Forest Resources and Wildlife Management. It also established Departments of Botany and Zoology within the Faculty of Science as well as a School of Environmental Studies. Most recently (1991), a Faculty of Agriculture was formed at Moi University. This new faculty concentrates on post-graduate training. A program in Soil Science began in 1992, one in Crop Science and Seed Technology in 1993, and programs in Agricultural Resource Economics and Management, and Agricultural Mechanization and Rural Engineering are expected to start in 1994.

The Jomo Kenyatta College of Agriculture and Technology, established in 1981 with the financial and technical assistance of Japan, became a constituent college of Kenyatta University in 1988. This university college focusses, among other things, on agricultural engineering, horticulture, and food processing and post-harvest technology.

2.2 Present Structure

KARI is by far the largest agricultural research organization in Kenya, accounting for 532 (65%) of the country's 818 full-time equivalent researchers in 1991 (table 2). KEFRI and KEMFRI constitute, respectively, 15% and 11% of the country's agricultural researchers. The remaining 9% of the research staff are divided more-or-less equally between the various semi-public and academic institutions. Although the number of academic institutions involved in agricultural research has grown over the past few years, the actual amount of time spent on research is low in most of these institutions.

In addition to the institutes described in table 2, there are several institutes that do some agricultural research but are not included in the statistical data reported here. One such institute is the Kenya Trypanosomiasis Research Institute (KETRI) which investigates the "sleeping-sickness" disease trypanosomiasis that affects both man and animals. KETRI is generally classified as a medical research institute although its research has relevance for livestock production as well as agricultural labor.

Table 2: Overview of Present NARS Structure, 1991/92

Institutional category	Supervising agency		Executing agency		Research focus	Staffed research sites ^a	Number of researchers		
	Name	Acronym	Name	Acronym			National	Expats	Total
Government	Ministry of Research, Science and Technology	Kenya Agricultural Research Institute	KARI	crop and livestock	34 (32)	482	[50]	532	532
		Kenya Marine and Fisheries Research Institute	KEMFRI	fisheries	8 (8)	85	2	87	87
	Kenya Forestry Research Institute	KEFRI	forestry	18 (14)	112	13	125	125	
	Coffee Board	Coffee Research Foundation	CRF	coffee	6 (1)	25	0	25	25
Semi-public	Tea Board	Tea Research Foundation of Kenya	TRFK	tea	1 (1)	12	1	13	13
	National Irrigation Board	National Irrigation Board	NIB	irrigation	2 (2)	6	1	7	7
	University of Nairobi	Faculty of Agriculture	FA/UN	crops, soil, economics, engineering, range management, food technology	1 (1)	107	8	115	8
Academic	University of Nairobi	Faculty of Veterinary Medicine	FVS/UN	animal health and production ^b	1 (1)	118	12	130	2
		Faculty of Science ^c	DB/UN	botany and zoology	1 (1)	39	10	49	3
	Egerton University	Institute for Development Studies	IDS/UN	socio-economics	1 (1)	15	2	17	2
		Faculty of Agriculture	FA/EU	crops, horticulture, animal health and production, dairy and food technology	1 (1)	38	3	41	2.1

Table 2: Overview of Present NARS Structure, 1991/92 (Contd.)

Institutional category	Executing agency			Research focus	Staffed research sites ^a	Number of researchers			
	Supervising agency	Name	Acronym			National	Expats	Total	FTEs
Academic	Egerton University	Faculty of Science ^d	FS/EU	biology, engineering, and natural resources	1 (1)	53	2	55	2.8
		Faculty of Arts and Social Sciences ^e	FASS/EU	socio-economics	1 (1)	33	1	34	1.7
		Faculty of Forest Resources and Wildlife Management	FFRWM/MU	forestry, fisheries, and wildlife	1 (1)	24	6	30	2.1
	Moi University	Faculty of Agriculture ^f	FA/MU	crops, seed technology, soils, economics, mechanization	1 (1)	8	0	8	0.0
		Faculty of Science	FS/MU	botany and zoology	1 (1)	16	3	19	1.0
		School of Environmental Studies	SES/MU	natural resources	1 (1)	9	3	12	0.6
Kenya University	Jomo Kenyatta University College of Agriculture and Technology	JKUCAT	agr. engin., food and post-harvest technology, horticulture	1 (1)	[20]	[4]	24	1.2	
	Faculty of Science ^c	FS/EU	botany and zoology	1 (1)	41	1	42	2.1	
Total					82 (71)	1243	122	1365	817.6

Source: 0999.

Note: Data in square brackets are inferred or constructed by authors.

^aStaffed with researchers and/or technicians. Bracketed sites are staffed with researchers.

^bThe Department of Animal Production within FVS is operated jointly with the Faculty of Agriculture.

^cIncludes the Departments of Botany and Zoology.

^dIncludes the Departments of Biological Sciences, (Agricultural) Engineering, and Natural Resources.

^eIncludes the Department of Economics and Business Management (previously the Department of Agricultural Economics) and the Department of Home Economics.

^fEstablished in 1991, operational as of 1992. Given the initial stage of development, we assumed that there is no research underway yet. The research focus in this case reflects the proposed orientation of the faculty's research activities.

Also excluded are the regional and international agricultural research organizations that are headquartered in Kenya (e.g., ICRAF, ILRAD, and ICIPE) or who maintain a regional office in Kenya (e.g., CIMMYT, ICARDA, and ILCA). Kenya has by far the highest concentration of regional and international organizations in the region. Although these organizations have a supra-national mandate, and are consequently excluded from this overview, their presence no doubt enhances the local research environment in many ways.

KARI has a Board of Management, a director, and three departments each headed by a deputy director (crops and soil/water management research, livestock research, and planning, finance, and administration). Each research department has three divisions. For the department of crops and soil/water management these are: (1) horticulture and industrial crops, (2) roots and cereal crops, and (3) soil and water management; and for the department of livestock: (1) animal production, (2) range and arid lands, and (3) animal health. At present KARI has a network of 17 national research centers and nine regional research centers. Three of the national centers have a regional as well as a national mandate. In addition, there are nine subcenters reporting to either a national or a regional center. Although financed largely by the Kenyan Government and external donors, KARI also receives contributions from entities for which it conducts contract research such as the Kenya Seed Company, the Pyrethrum Board of Kenya, Kenya Breweries Ltd, and agrochemical firms (Okech 1991).

Like KARI, KEFRI and KEMFRI also have an independent status and are governed by a Board of Management. KEFRI has a fragmented organizational structure, consisting of 15 rather small research divisions or programs covering a diverse set of subjects such as agroforestry, dryland forestry, urban tree planting, and biotechnology. In addition, KEFRI has 18 research centers and stations scattered throughout the country. Most of these sites are staffed with only a few researchers. KEMFRI's management team consists of one director and three deputy directors in charge of administration, research and development, and inland waters, respectively. The deputy director for inland waters is also head of the Kisumu Laboratories. The head of the Mombasa Laboratories reports to the deputy director for administration, while the heads of the laboratories at Kegati, Baringo, Naivasha, Turkana,

and Sangoro report to either the deputy director for research and development or the deputy director for inland waters. All laboratories have a biological research division. The laboratories at both Mombasa and Kisumu also have a physical and chemical research division, while at headquarters in Mombasa there is also a fisheries marketing unit.

The Coffee Research Foundation (CRF) is governed by a Board of Directors on which farmers, the Coffee Board of Kenya, KARI, and the Ministry of Agriculture are represented. The day-to-day management of CRF is delegated to the Director of Research who is assisted by a Deputy Director of Research. CRF has seven research sections covering experimental agronomy, chemistry, crop physiology, plant breeding, agricultural economics, plant pathology, and entomology. In addition, there is a research liaison unit and several service sections. All the researchers are based at headquarters. However, in addition to the Jacaranda, Rukera and Azania estates, there are substations at Kisumu, Meru, and Kisii, and a demonstration plot at Namwela.

The Tea Research Foundation of Kenya (TRFK) is managed by a Board of Directors, on which are represented the Tea Board of Kenya, the Ministry of Agriculture, the Kenya Tea Development Authority, Kenya Tea Growers' Association, and KARI. TRFK is supported by the Tea Board of Kenya. The day-to-day management of TRFK is delegated to the Director who

is assisted by a Deputy Director. The internal structure of TRFK consists of five research departments, namely: agronomy, botany, chemistry, crop environment, and plant protection. In addition it has an extension service and a research economist position. All researchers are based at headquarters, although field experiments are conducted on farmers' fields throughout the country.

The present organizational structure for several of the main research organizations are provided in diagrammatic form in appendix 3.

3. NARS Statistics

Questionnaire responses were received from KARI, KEFRI, KEMFRI, CRF, TRFK, and the University of Nairobi and combined with data and information from sources cited at the conclusion of this brief. More detailed institutional data are provided in appendices 5 and 6.

The expenditure data presented in this brief are based on the actual expenditures as reported by the various institutes. However, institutes often underestimate the degree of donor support because their information is limited to the donor support that is channeled through their accounting system. More specifically, institutes often underreport or fail to report the salaries and supplements paid directly to expatriate researchers, which can be a significant omission. To correct for this problem in the Kenyan data, we constructed an implicit cost series for expatriate researchers (see appendix 2) and where necessary added this to the expenditures reported by the various institutes.

3.1 Long-Term Development

The Kenyan NARS has grown steadily during the past three decades, although the growth in the number of researchers has been considerably larger than the growth in expenditures (table 3). This has led to a long-run decline in the amount of financial resources available per researcher, a trend that has been reversed only recently due to the considerable capital investments being made under the auspices of the National Agricultural Research Project (NARP) which began in 1987/88. A second phase of this project is planned to begin in 1993.

Kenya has historically had a relatively high intensity of agricultural research activity. In the early 1960s, there were, on-average, 15 researchers per million farmers on the African continent compared with 37 in Kenya. In 1981-85 the regional average had increased to 42 and in Kenya to 89 researchers per million farmers. In terms of expenditures as a percent of AgGDP, Kenya has maintained its intensity ratio well above one percent throughout the past three decades, compared with less than half a percent for the sub-Saharan African region as a whole.

Although the number of researchers per million farmers steadily increased over the past three decades, expenditures as a percentage of AgGDP peaked in 1971, declined during the seventies, stagnated during the eighties, and has begun to trend slightly upward only in recent years. Underlying this fluctuating research intensity ratio is a rather steady growth in agricultural output. Real AgGDP grew at an annual average rate of 4.3% over the past three decades, an exceptionally high growth rate for Africa.

Table 3: *NARS Researcher and Expenditure Series, 1961-91*

	1961-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991	annual growth rate ^a
								%
Researchers (FTEs)	137.9	230.7	365.9	409.2	562.5	706.7	818.7	6.4
Expenditures (million 1985 shillings per year)	141.287	215.666	316.791	347.288	376.777	445.540	542.838	4.3
Expenditures (million 1985 PPP dollars per year)	24.337	37.149	54.568	59.821	65.003	77.129	93.653	4.3
Expenditures per researcher (1985 PPP dollars per year)	177,000	162,000	149,000	146,000	116,000	109,000	114,000	-1.9
Number of farmers (millions)	3.7	4.2	4.8	5.5	6.3	7.2	7.9	2.7
Researchers per million farmers	36.8	54.4	75.9	74.1	88.8	97.8	104.2	3.6
AgGDP (million 1985 PPP dollars)	1953	2516	3277	4022	4797	5649	6051	4.3
Expenditures as a % of AgGDP	1.39	1.72	1.73	1.40	1.36	1.39	1.76	-0.4

Source: See appendices 5 and 6.

Note: Includes KARI, KEFRI, KEMFRI, CRF, TRFK, NIB, and the University of Nairobi, Moi University, Egerton University, Kenyatta University, and JKUCAT.

^a Least squares growth rate for the 1961-91 period.

3.2 Human Resources

Degree and Nationality Status of Researchers

Table 4 presents a fairly detailed, long-run overview of developments concerning the country's agricultural research staff. At independence in 1963 only a few African researchers were employed by the agricultural research organizations in Kenya. Although the number of Kenyan researchers increased rapidly after independence, the number of expatriate

researchers also continued to increase. It took until the mid-1970s before the number of expatriate researchers actually began to decline. At present, less than 10% of the research staff are expatriates compared with 85% in the early 1960s. Initially the expatriates were nearly all British nationals but now the mix of nationalities is much more heterogenous.

The national agricultural research staff developed steadily in terms of numbers and degree status. In the immediate post-independence years the pattern of growth reflects an intake of BSc-level researchers who were gradually upgraded to higher-degree levels. However, the upgrading to PhD level appears to have been relatively slow and in the early 1980s the number of PhDs even declined. This probably reflects the organizational restructuring the research system experienced at that time and the more attractive opportunities PhD-level staff had outside the research system.

Table 4: *Educational and Nationality Status of Researchers*

Institutional category ^a	Researcher status	1961-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991
		<i>(full-time equivalents)</i>						
Government	PhD	2.6	2.2	8.8	13.6	10.8	27.8	39.0
	MSc	3.9	22.0	60.1	95.7	159.8	242.4	279.0
	BSc	9.4	36.1	83.2	145.0	275.8	308.0	361.0
	Subtotal	16.0	60.2	152.1	254.4	446.4	578.2	679.0
	Expat	65.6	71.1	98.1	74.8	67.4	63.4	65.0
	Total	81.6	131.3	250.2	329.1	513.8	641.6	744.0
Semi-public	PhD	0.6	1.6	3.0	3.4	3.5	4.0	5.0
	MSc	0.2	0.6	4.8	9.9	16.0	21.9	26.0
	BSc	0.8	4.0	7.8	9.3	10.3	13.8	12.0
	Subtotal	1.6	6.2	15.6	22.6	29.7	39.7	43.0
	Expat	12.5	25.4	24.0	13.3	6.3	2.2	2.0
	Total	14.1	31.6	39.6	36.0	36.0	41.8	45.0
Regional ^b	PhD	0.2	2.0	5.4	7.0	-	-	-
	MSc	0.1	2.6	5.4	13.0	-	-	-
	BSc	2.6	3.0	10.2	17.5	-	-	-
	Subtotal	2.9	7.6	21.0	37.5	-	-	-
	Expat	38.4	56.2	48.2	37.5	-	-	-
	Total	41.3	63.8	69.2	75.0	-	-	-
Academic	PhD	0.1	0.6	1.9	5.3	6.3	9.5	11.6
	MSc	0.0	0.5	1.2	3.4	3.2	8.5	12.9
	BSc	0.1	0.4	0.3	1.1	0.9	2.1	2.4
	Subtotal	0.2	1.5	3.4	9.7	10.4	20.1	26.9
	Expat	0.8	2.5	3.5	4.4	2.3	3.2	2.8
	Total	0.9	4.0	6.9	14.1	12.7	23.3	29.7
Total	PhD	3.5	6.4	19.1	25.1	20.5	41.3	55.6
	MSc	4.3	25.7	71.4	114.2	179.0	272.8	317.9
	BSc	12.9	43.5	101.6	162.4	287.0	323.9	375.4
	Subtotal	20.6	75.5	192.1	301.7	486.5	638.0	748.9
	Expat	117.3	155.2	173.8	107.5	76.1	68.7	69.8
	Total	137.9	230.7	365.9	409.2	562.5	706.7	818.7

Source: see appendix 6.

^a Includes the same institutes as reported in table 3.

^b With the collapse of the East African Community in 1977, the Kenyan facilities and staff of EAAFRO and EAVRO were absorbed into the government sector. The 1976-80 average for the "regional" category relates only to the years 1976-77.

Gender

Over the period 1985 to 1991, about 20% of the research staff at the government institutes were female, 9% at the semi-public institutes, and 7% at the universities. KARI, with 21% female researchers, ranks high in this regard compared with other institutes in Kenya as well as elsewhere in Africa. The gender composition of KARI's research staff corresponds closely to the supply of new graduates. Between 1983 and 1989, the Faculty of Agriculture of the University of Nairobi had 951 graduates in the agricultural sciences of whom 222 (23%) were women (Bahemuka, Nzioka, and Mbatia 1992).

Staff Composition

Table 5 provides a detailed breakdown of each institute's total permanent staff. The number of technical support staff per researcher ranges between one and two for KARI, KEFRI, KEMFRI, and CRF. TRFK employs about seven technicians per researcher. Administrative support staff are about one per researcher for KARI, KEFRI, CRF, and TRFK, while KEMFRI has nearly five administrative support staff per researcher. KARI, KEFRI, and KEMFRI employ between six to 10 other support staff per researcher, while CRF and TRFK employ between 30 to 40 support staff per researcher. These high support-staff ratios for CRF and TRFK reflect the fact that both institutes have major plantations that are not only used for research but are also farmed to generate income. The rapid expansion of staff at KEFRI is noteworthy. In particular, the institute's staff in the "other support" category has grown dramatically.

Table 5: *Staffing Structure*

Staff category	KARI		KEFRI		KEMFRI		CRF		TRFK	
	1990	1991	1986-90	1991	1986-90	1991	1986-90	1991	1986-90	1991
	<i>(number of personnel)</i>									
Research	486	532	69	125	50	87	22	25	13	13
Support										
Technical	1107	1042	93	163	68	70	25	25	85	93
Administrative	656	648	73	100	246	361	17	20	11	11
Other	3419	3364	414	1226	503	553	833	970	266	296
Subtotal	5182	5054	580	1489	817	984	875	1015	362	400
Total	5668	5586	649	1614	867	1071	897	1040	375	413

Source: 0999.

3.3 Financial Resources

Expenditures

Table 6 provides a breakdown of the agricultural research expenditures by institutional category. The governmental and regional institutes together accounted for a fairly constant share (80-85%) of Kenya's public-sector agricultural research expenditures during the past 30 years. The semi-public institutes maintained a share of between 13-18%, and the academic sector a residual share of about 0-4%.

Table 6: *Agricultural Research Expenditures*

Institutional category	1961-65	1971-75	1981-85	1986	1987	1988	1989	1990	1991
<i>(millions 1985 PPP dollars per year)</i>									
Government	12.938	33.513	54.875	54.016	58.707	64.077	63.736	64.994	76.642
Semi-Public	3.639	8.126	8.495	12.567	12.737	13.581	13.343	13.195	13.231
Regional	7.636	11.954	-	-	-	-	-	-	-
Academic	0.124	0.975	1.632	1.595	2.956	3.176	3.432	3.530	3.779
Total	24.337	54.568	65.003	68.178	74.401	80.835	80.511	81.719	93.653

Source: See appendix 6.

Factor Mix

Table 7 provides a breakdown of the expenditures by various cost categories and reveals markedly different cost structures across the various institutes. Personnel expenditures as a percentage of total expenditures are exceptionally high for KEFRI and KEMFRI. KARI's cost structure looks more normal, although operating expenditures have decreased relative to personnel expenditures over the past three years. TRFK is at the other extreme of the spectrum with a rather low share of its expenditures going to personnel expenditures. This is (partly) due to the fact that the salaries of the agricultural laborers working on the tea estates of TRFK are not included under personnel costs but under operating costs.

Source of Funds

The four organizations that provided some information about their sources of funding are presented in table 8. Compared with the other research institutes, donor support to KARI has been relatively high. The donor share in total expenditures has increased considerably over the period 1986 to 1991, which reflects the support provided by the World Bank and other donors through the National Agricultural Research Project (NARP) to KARI. However, the KARI expenditure data presented in this brief apparently do not include all the donor-sourced expenditures under the NARP. For example, during 1990, 91, and 92 there were, respectively, 122, 88, and 155 KARI researchers away on long-term training. The small share of KARI's total reported spent on training (table 7) suggests that the full costs of the long-term training are not included in KARI's financial statements. For reasons of consistency and practicality we have not attempted to correct for this omission in the expenditures included in this brief.

Table 7: Breakdown of Expenditures by Cost Category

Institute	Cost category	1985	1986	1987	1988	1989	1990	1991
		<i>(percentages)</i>						
KARI	Personnel	-	na	na	na	52.1	60.2	49.9
	Operating	-	na	na	na	31.2	23.1	19.6
	Maintenance	-	na	na	na	10.2	10.3	7.1
	Training	-	na	na	na	1.5	1.2	1.0
	Capital	-	na	na	na	5.0	5.2	22.4
	<i>Total</i>	-	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>100</i>	<i>100</i>
KEFRI	Personnel	na	na	87.5	60.9	96.9	96.4	96.5
	Operating	na	na	2.4	30.2	2.3	3.1	3.1
	Maintenance	na	na	1.2	0.1	0.2	0.3	0.2
	Training	na	na	0.1	0.1	0.1	0.2	0.2
	Capital	na	na	8.7	8.7	0.5	0.1	0.1
	<i>Total</i>	<i>na</i>	<i>na</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>
KEMFRI	Personnel	89.3	78.5	85.7	90.9	94.5	97.1	86.4
	Operating ^a	10.6	13.2	10.1	4.6	5.4	2.9	13.5
	Training	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Capital	0.0	8.3	4.1	4.4	0.0	0.0	0.0
	<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>
CRF	Personnel ^b	43.1	42.2	44.1	47.1	43.7	44.5	51.4
	Operating ^a	37.2	32.2	32.2	32.5	33.3	37.6	42.1
	Capital	19.8	25.6	23.7	20.4	23.0	17.9	6.5
	<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>
TRFK	Personnel ^c	34.9	33.9	28.7	36.0	40.3	37.7	36.2
	Operating	46.2	44.7	46.4	39.7	37.0	39.0	42.6
	Maintenance	8.2	8.1	8.6	9.0	8.5	7.8	8.2
	Training	1.6	2.1	2.6	1.0	0.6	2.5	1.7
	Capital	9.2	11.3	13.7	14.3	13.7	13.0	11.3
	<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>

Source: 0999 and 1174.

^a Includes maintenance costs.

^b Includes training costs.

^c The salaries for agricultural laborers are included under operating costs.

Table 8: *Source of Funding*

Institute	Source of funding	1985	1986	1987	1988	1989	1990	1991
		<i>(percentages)</i>						
KARI	Government	-	76	na	na	55.9	52.9	48.1
	Sales	-	0	na	na	3.3	4.2	3.0
	Donors	-	24	na	na	40.8	42.9	48.9
	<i>Total</i>	-	100	na	na	100	100	100
KEMFRI	Government	88.5	82.3	85.0	93.2	97.8	97.7	96.7
	Donors	11.5	17.7	15.0	6.8	2.2	2.3	3.3
	<i>Total</i>	100	100	100	100	100	100	100
CRF	Government	13.0	9.9	4.6	0	2.9	1.5	0
	Sales	29.4	43.0	9.5	17.8	6.9	11.4	13.9
	Taxes	53.7	41.8	83.1	79.7	87.6	85.6	83.7
	Interest, etc.	3.9	5.3	2.7	2.4	2.6	1.5	2.4
	<i>Total</i>	100	100	100	100	100	100	100
TRFK	Sales	28.2	17.9	22.1	15.1	19.7	29.3	27.5
	Taxes	64.5	74.5	77.0	78.0	73.7	65.1	66.0
	Donors	5.4	5.3	0	5.6	5.9	5.3	5.2
	Interest, etc.	1.9	2.3	0.9	1.3	0.7	0.3	1.3
	<i>Total</i>	100	100	100	100	100	100	100
Total	Government	na	65.1	na	na	49.7	48.4	45.8
	Sales	na	6.2	na	na	4.1	5.7	4.8
	Taxes	na	8.2	na	na	15.8	12.9	12.1
	Donor	na	19.6	na	na	30.1	32.8	37.0
	Other	na	0.8	na	na	0.4	0.2	0.3
	<i>Total</i>	na	100	na	na	100	100	100

Source: 0999 and 1087.

3.4 Research Focus

An overview of the research focus of the Kenyan NARS is provided in table 9. In 1991 most researchers focused on crop production (46%), while livestock, forestry, and fisheries received more-or-less equal attention (10-14%). Nearly 10% of the researchers worked on natural resources issues, and six percent on non- or cross-commodity research. The research focus of the universities was largely in the "other" category with particular emphasis on economics, engineering, and post-harvest and food processing disciplines.

Table 9: *Research Focus, 1991*

Research focus	KARI	KEFRI	KEMFRI	CRF	TRFK	NIB	Universities	Total	
								FTE	Share
									<i>(full-time equivalents)</i>
									%
Crop	326.5	0	0	25.0	13.0	0	7.9	372.4	45.5
Livestock	106.4	0	0	0	0	0	6.4	112.8	13.8
Forestry	0	98.6	0	0	0	0	2.0	100.6	12.3
Fisheries	0	0	87.0	0	0	0	0.1	87.1	10.7
Natural resources	64.6	4.9	0	0	0	7.0	2.0	78.5	9.6
Other	34.5	21.4	0	0	0	0	10.4	66.3	8.1
<i>Total</i>	<i>532.0</i>	<i>125.0</i>	<i>87.0</i>	<i>25.0</i>	<i>13.0</i>	<i>7.0</i>	<i>28.8</i>	<i>817.7</i>	<i>100</i>

Source: 0999

Note: The “natural resources” and “other” categories include research that could not otherwise be allocated to a specific commodity or commodity group. The natural resource category refers to unallocatable soils, land use, and water research.

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This bibliography comprises three different sets of references. The "references" section relates to references cited in the text, the "data sources" to references from which data have been extracted to construct the time series (see appendices 5 and 6), and "other references" to references that have been consulted in the process of data collection but not used explicitly.

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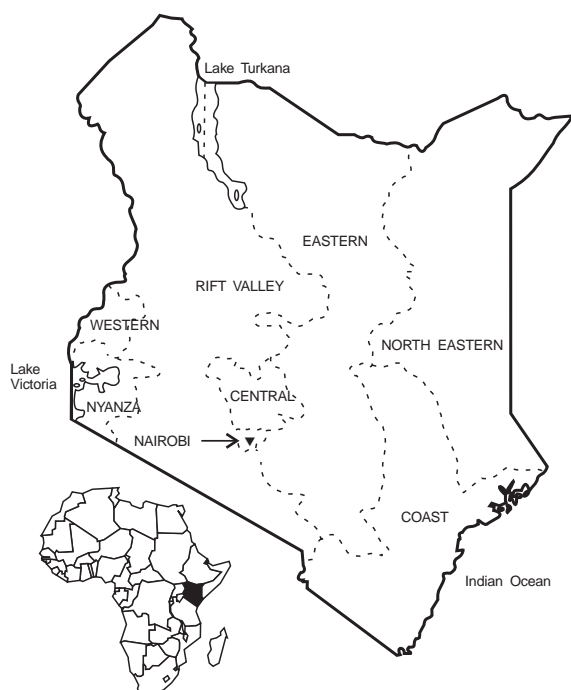
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Appendix I: Country background information



Geography

Area: 58.0 million ha

Location: lies on the equator in East Africa. Bordered on the south by Tanzania, to the north lies Ethiopia, to the west Uganda and to its east, Somalia, and approximately 400 km of coastline.

Agroecological features: influenced mainly by soil, rainfall, temperature, vegetation, and evapotranspiration. Seven main zones: humid (2.54 mill. ha), subhumid (2.38 mill. ha), semihumid (2.57 mill. ha), semihumid to semiarid (2.87 mill. ha), semi-arid (8.73 mill. ha), arid (12.64 mill. ha), and very arid (26.53 mill. ha) are identified. Most of the humid, subhumid and semihumid zones, especially in the highlands, constitute the high and medium potential areas of agricultural production characterized by high productivity of coffee, tea, maize, wheat, barley, oil-seeds, and intensive dairy farming. The semihumid to semiarid and semiarid zones are of marginal to low agricultural potential and are characterized by subsistence, small-holder crop and livestock farming, and commercial ranching. The large arid and very arid zones are of extremely low potential supporting sparse and erratic nomadism, pastoralism and wild-life, and little or no subsistence crop farming.

Population

Total (1991): 25.0 million
 Annual growth rate (1981-90)^a: 3.8%
 Literacy (1990): 69.0%
 Life expectancy (1991): 59 years

Economy (values reported in 1985 PPP dollars)

Gross Domestic Product (1991): 23,180 million dollars
 Per capita GDP (1991): 927 dollars

Agricultural GDP (1991): 6,051 million dollars
 Share of agriculture in GDP (1991): 26.1%

Annual growth rates (1981-90)^a
 GDP: 4.5%
 GDP per capita: 0.7%
 AgGDP: 3.2%

Trade (values reported in current dollars)

Net surplus total trade (1991): -1,069 million dollars
 Net surplus agricultural trade (1991): 460 million dollars

Percentage of agricultural imports in total imports: 10.5%
 Percentage of agricultural exports in total exports: 62.6%

Major agricultural import commodities (1991)^b: palm oil (33%), wheat (13%), forestry products (11%), rice (9%), and tea (8%)

Major agricultural export commodities (1991)^b: tea (49%), coffee (34%), canned pineapples (8%), and cotton lint (2%)

Agriculture

Agricultural land (1990): 40.5 million ha
 Annual growth rate (1981-90)^a: 0.04%
 Percentage arable: 4.8%
 Percentage permanent crop: 1.2%
 Percentage permanent pastures: 94.0%

Percentage of arable and permanent cropland irrigated: 2.2%

Economically active agricultural population (1991): 7.9 million

Annual growth rate (1981-90)^a: 2.7%
 Percentage in total economically active population: 76.5%

Sources: Europa Publications (1992), FAO (1993), and World Bank (1992).

^a Least squares growth rate.

^b Bracketed percentages represent value shares of the respective total.

Fertilizer use per ha arable land (1990): 47.7 kg
Annual growth rate (1981-90)^a: 5.1%

Major crops (in order of value of production): maize,
tea, coffee, and sugar cane

Appendix 2: Definitions and concepts

NARS

The construction of quantitative and internationally comparable expenditure, personnel, and related measures of a national agricultural research system (NARS) requires a precise idea of what, in fact, is being measured. Since the term NARS is subject to a variety of interpretations, it is necessary to define rather precisely the NARS concept used here. Our approach adheres, wherever possible and appropriate, to the internationally accepted statistical procedures and definitions developed by the OECD and UNESCO for compiling R&D statistics (OECD 1981 and UNESCO 1984). For statistical purposes a NARS is defined in terms of the following characteristics:

(a) *National*. The concept of a “national” system used in this report refers to domestically targeted research activities funded and/or executed by the public sector of a particular country. A relatively broad concept of the public sector is taken to include government, semi-public and academic research institutes. However, private, for-profit research as well as the research activities of supranational research agencies that are not executed through national institutes are excluded. Also excluded is research undertaken by short-term development projects.

(b) *Agricultural*. Agricultural research, as defined here, includes crop, livestock, forestry, and fisheries research, as well as research on agricultural inputs, the natural resource base, and socio-economic aspects of primary agricultural production. It excludes, where possible, research concerning the off-farm storage and processing of agricultural products, commonly referred to as post-harvest research and food-processing research. This delineation corresponds with the national accounts definition of the agricultural sector.

(c) *Research*. Research is often performed in conjunction with other activities such as extension, education, and production. To the extent possible, research activities (in terms of expenditures and staff) are differentiated from these other activities. However, if non-research activities were an integral part of an institute’s research activities, and accounted for less than 20% of the resources of the institute, it was expedient to classify all the activities of the institute as being research-related.

Full-Time Equivalent (FTE)

A full-time equivalent researcher year is taken to be a person who holds a full-time position as a researcher during the whole year. Adjustments to full-time equivalents have only been made when: (a) a research position was part-time; (b) a research position was not

filled for the whole year; or (c) if the position explicitly involved tasks other than agricultural research. In the latter case an estimate was made of the time spent on agricultural research. No adjustments were made, however, for vacation or sick leave nor for time spent on administration, meetings, travel or other activities that form part of the normal duties required to support a research endeavor. Following this line of reasoning, professional staff in management positions were classified as researchers.

The degree status of researchers is determined on the following basis: 3-4 years full-time university education (BSc), 5-6 years (MSc), and more than 6 years plus doctorate thesis (PhD).

Expatriate Researcher Costs

Many expatriate researchers working on donor-supported projects in NARSs are paid their salaries and living expenses directly by the donor agency. All (or some substantial fraction) of these costs do not get included in the financial reports of the agricultural research organizations. To calculate these *implicit* costs we took the average cost per researcher in 1985 to be 120,000 “1985 PPP dollars” and backcast this figure using the rate of change in real personnel costs per FTE researcher in the US state agricultural experiment station system. This extrapolation procedure makes the assumption that the personnel-cost trend for US researchers is a reasonable proxy of the trend in real costs of internationally recruited staff working in NARSs. Unless otherwise stated, FTE expatriate researchers were costed at \$80,000 “1985 PPP dollars” per researcher for the 1961-65 period, \$85,000 per researcher for 1966-70, \$90,000 per researcher for 1971-75, \$110,000 per researcher for 1976-80, and \$120,000 per researcher for 1981-91.

Deflators and Exchange Rates

All expenditure figures were first compiled in current local currency units (appendix 5). In order to facilitate comparisons over time and across countries these figures are deflated with a local GDP deflator to base year 1985, and then converted to a common currency (US dollars) using the 1985 purchasing power parity (PPP) over GDP. PPPs are synthetic exchange rates that attempt to reflect the purchasing power of a country’s currency. The PPPs used here are derived from the Penn World Table (Mark 5) which is based on the benchmark studies of the International Comparison Project (Summers and Heston 1991). For additional information on currency conversion methods in this context see Pardey, Roseboom, and Craig (1992).

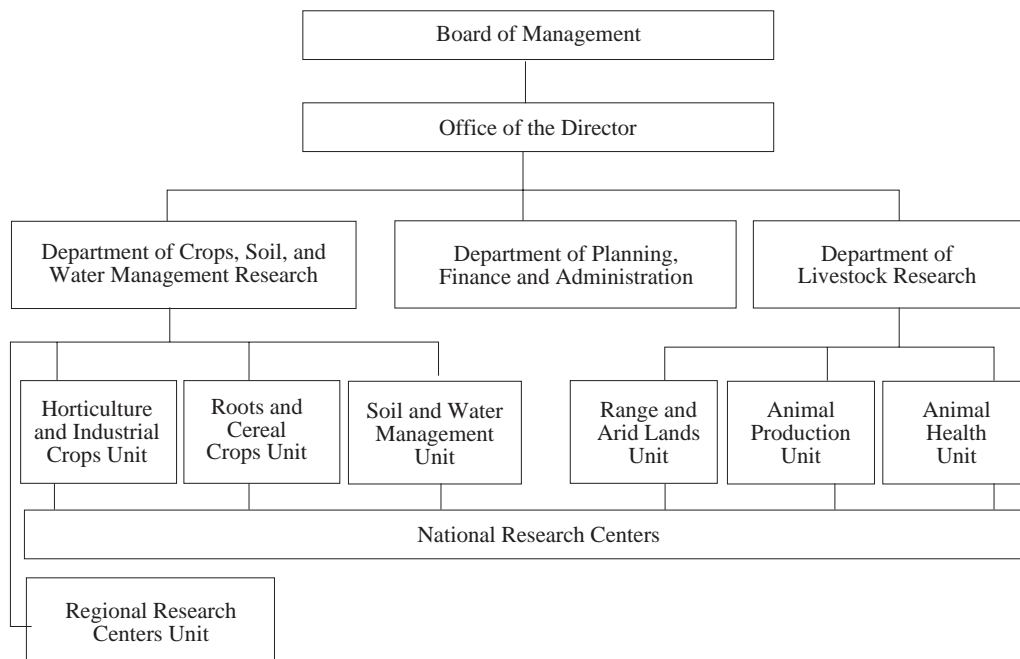
Nomenclature for tables in text

A zero indicates an actual observation of zero, a dash indicates that an observation is not relevant (due to institutional mergers, closures and so on), while “na” indicates an observation that is not available.

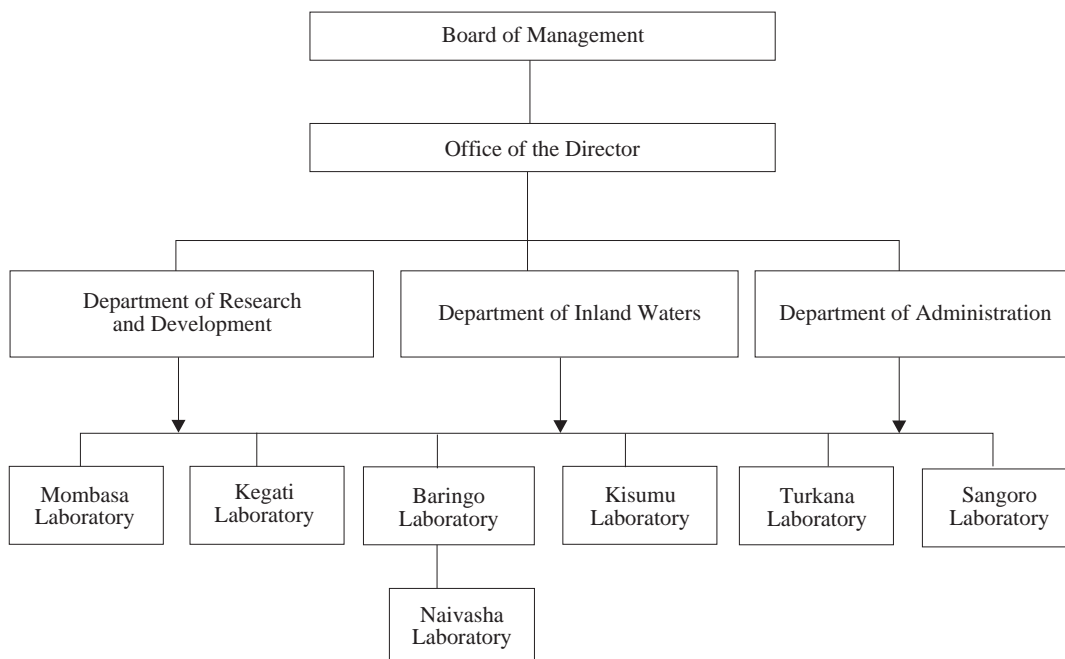
In the text we note any marked deviations from these data compilation norms and include points of clarification if warranted.

Appendix 3: Organizational charts of the agricultural research institutes

Kenya Agricultural Research Institute (1991/92)

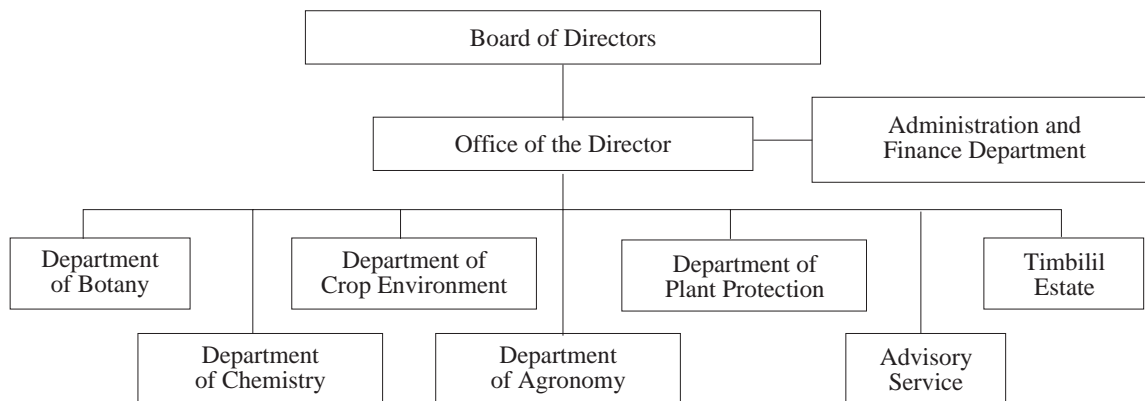


Kenya Fisheries and Marine Research Institute (1991/92)

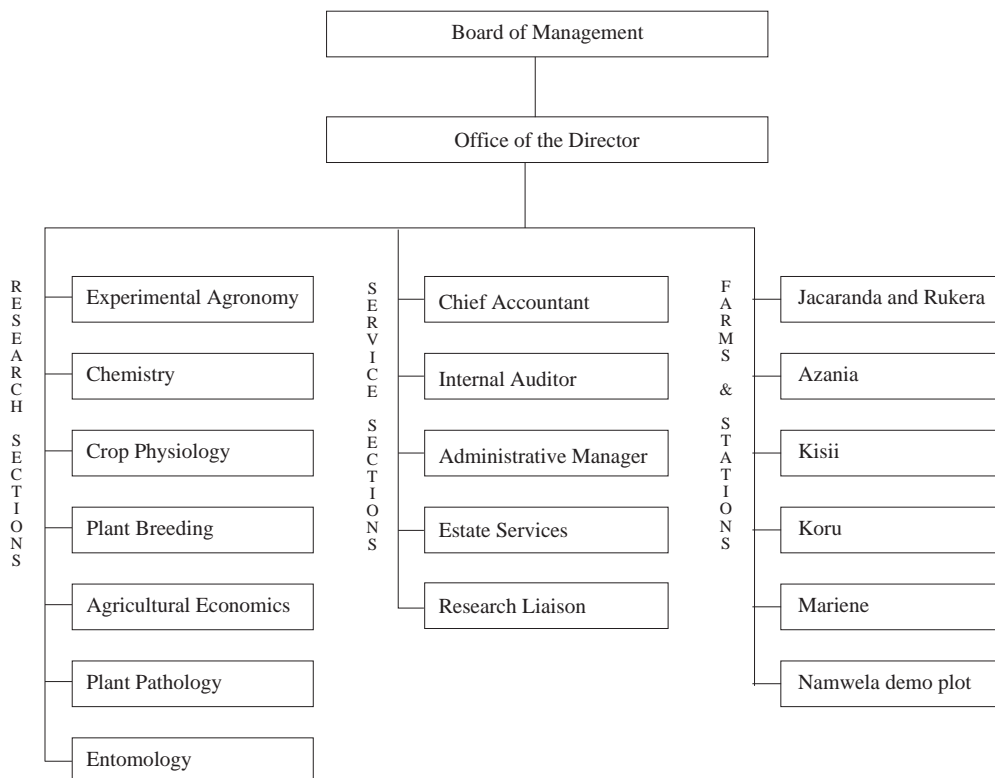


Appendix 3: Organizational charts of the agricultural research institutes (contd.)

Tea Research Foundation of Kenya (1991/92)

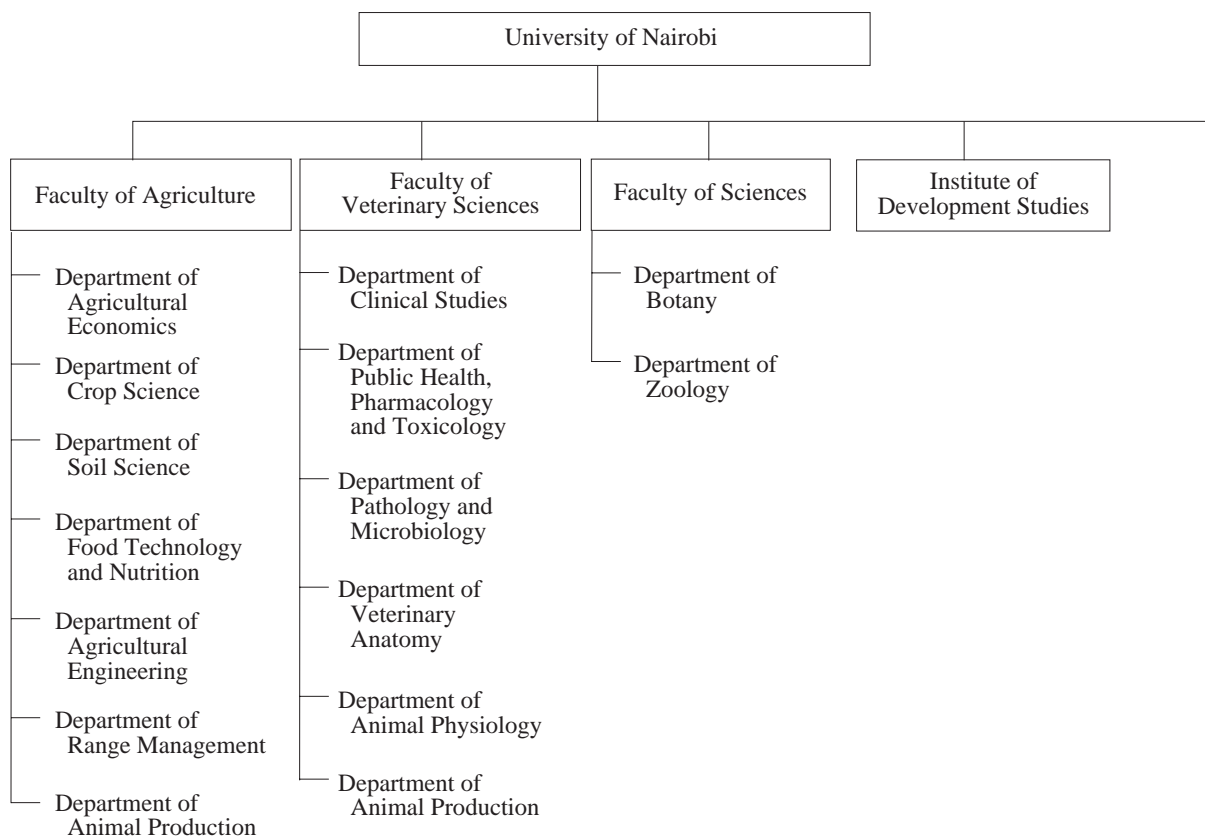


Coffee Research Foundation (1991/92)

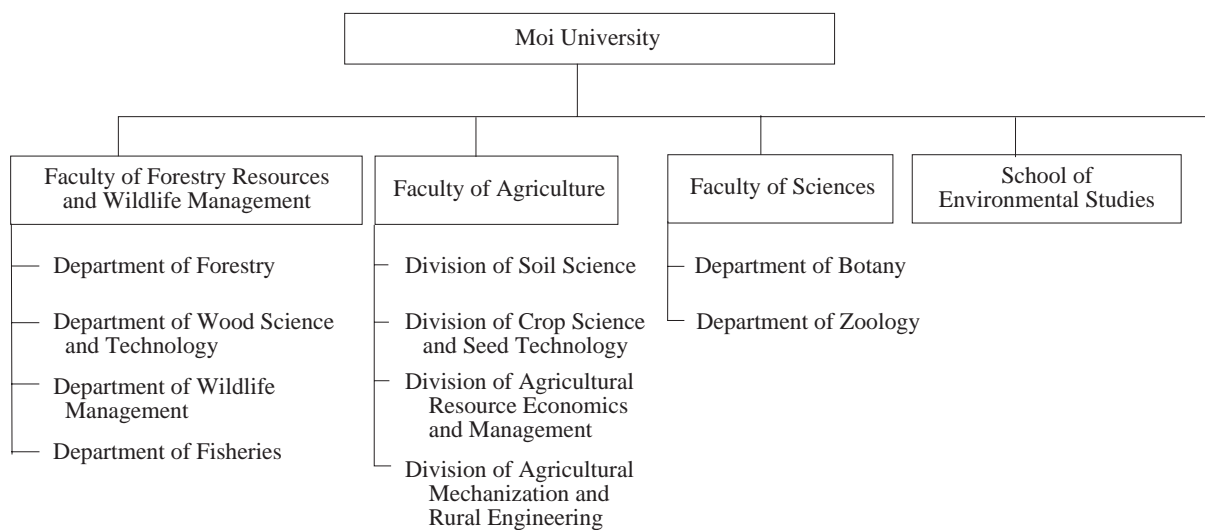


Appendix 3: Organizational charts of the agricultural research institutes (contd.)

University of Nairobi (1991/92)

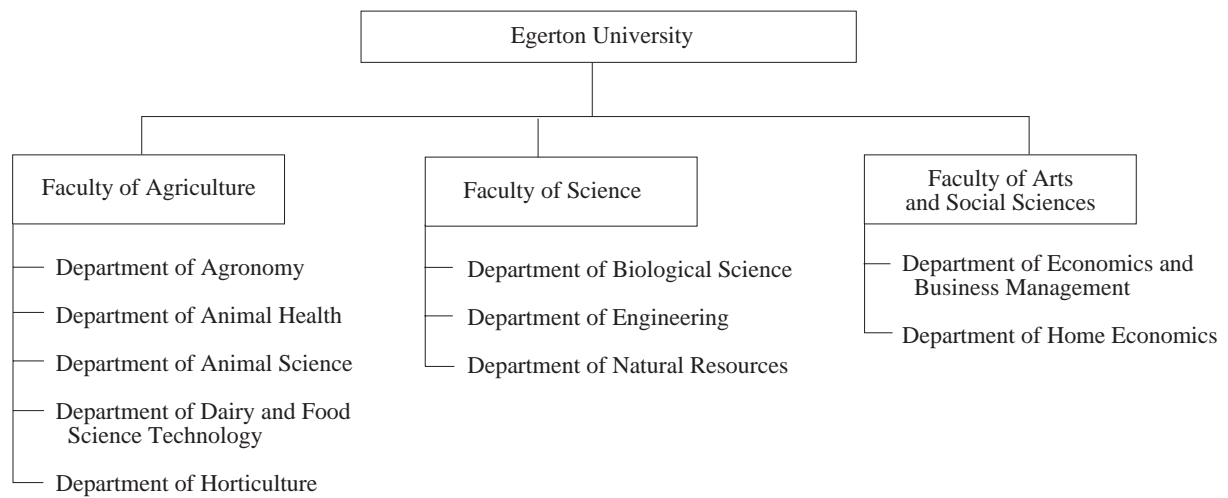


Moi University (1991/92)

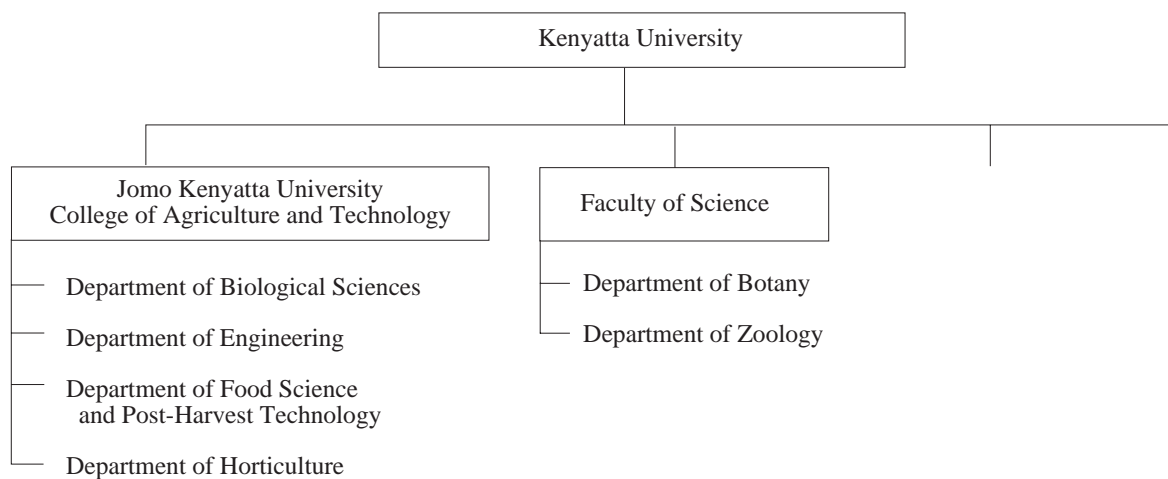


Appendix 3: Organizational charts of the agricultural research institutes (contd.)

Egerton University (1991/92)



Kenyatta University (1991/92)



Appendix 4: Addresses of the agricultural research institutes

Ministry of Research, Science and Technology
P.O. Box 30568
NAIROBI

Kenya Agricultural Research Institute
P.O. Box 57811
NAIROBI

Kenya Forestry Research Institute
P.O. Box 20412
NAIROBI

Kenya Marine and Fisheries Research Institute
P.O. Box 81651
MOMBASA

Coffee Research Foundation
P.O. Box 4
RUIRU

Tea Research Foundation of Kenya
Head Office and Central Research Unit
Timbilil Estate
P.O. Box 820
KERICHO

National Irrigation Board
P.O. Box 30372
NAIROBI

Faculty of Agriculture
Nairobi University
Kabete Campus
P.O. Box 29053 or 30197
NAIROBI

Faculty of Veterinary Sciences
Nairobi University
Kabete Campus
P.O. Box 29053 or 30197
NAIROBI

Department of Botany
Faculty of Science
University of Nairobi
P.O. Box 30197
NAIROBI

Department of Zoology
Faculty of Science
University of Nairobi
P.O. Box 30197
NAIROBI

Institute of Development Studies
University of Nairobi
P.O. Box 30197
NAIROBI

Faculty of Forestry and Wildlife Management
Moi University
P.O. Box 3900
ELDORET

Faculty of Agriculture
Moi University
Chepkoilel College Campus
P.O. Box 1125
ELDORET

Department of Botany
Faculty of Science
Moi University
P.O. Box 3900
ELDORET

Department of Zoology
Faculty of Science
Moi University
P.O. Box 3900
ELDORET

School of Environmental Studies
Moi University
P.O. Box 3900
ELDORET

Faculty of Agriculture
Egerton University
P.O. Box 536
NJORO

Jomo Kenyatta University College of Agriculture and
Technology
P.O. Box 62000
NAIROBI

Department of Botany
Kenyatta University
P.O. Box 43844
NAIROBI

Department of Zoology
University
P.O. Box 43844
NAIROBI

Appendix 5a: Research totals, 1961-91

Total Number of FTE Researchers		1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Category	Name institute	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Government	SRO/MOA	48	53	57	51	58	73	84	74	96	110	144	192	186	180	208
	VRD/MOA	20	21	22	27	24	26	24	29	31	35	42	46	44	50	38
	KARI-Muguga															
	KARI															
	Forestry/MNR	4.3	4.0	3.7	3.3	3	3.3	3.7	4	6.5	9	10	8.0	6.0	4	4.7
	KEFRI															
	Fisheries/MT&WL	1	1	1	1.9	3.9	5.9	7.7	9.6	11.5	13.4	15.2	16.5	17.7	18.9	20.1
	KIMFRI															
Government subtotal		73.3	79.0	83.7	83.2	88.9	108.2	119.4	116.6	145.0	167.4	211.2	262.5	253.7	252.9	270.8
Semi-public	TRF	2	2.5	3	4	5	6	6	5	6	7	7	5	7	7	8
	CRF	8	9	10	11	16	17	21	21	19	20	19	23	23	18	15
	NIB					2	2	4	6	8	10	11	12	14	15	14
Semi-public subtotal		10.0	11.5	13.0	15.0	21.0	25.0	31.0	32.0	33.0	37.0	37.0	40.0	44.0	40.0	37.0
Regional	EAAIRO	22.5	23.8	25	25	29	35	45	45	47	48	44	41	37	43	42
	EAVRO	15	14.5	14	18	19.5	21	13	20	22	23	28	29	25	27	30
Regional subtotal		37.5	38.3	39.0	43.0	48.5	56.0	58.0	65.0	69.0	71.0	72.0	70.0	62.0	70.0	72.0
Academic	UN/FA					1.0	1.0	1.0	1.3	1.7	2.1	1.7	1.9	2.1	2.2	2.4
	UN/EVS		0.3	0.5	0.8	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.6	0.8	0.8	0.8
	UN/DBOT		0.2	0.3	0.4	0.4	0.3	0.3	0.4	0.5	0.6	0.6	0.6	0.6	0.5	0.4
	UN/DZOO		0.1	0.2	0.4	0.3	0.3	0.3	0.4	0.5	0.6	0.6	0.6	0.6	0.5	0.4
	UN/IDS							1.1	1.7	2.4	3.0	2.5	1.6	0.7	0.8	0.8
	MU/FFR&WM															
	MU/DBOT															
	MU/DZOO															
	MU/SES															
	Egerton															
	KU/JKUCAT															
	KU/DB															
	KU/DZ															
Academic subtotal		0.0	0.6	1.0	1.5	1.6	1.7	2.9	4.0	5.1	6.3	5.7	5.5	6.2	8.1	9.0
TOTAL		120.8	129.4	136.7	142.7	160.0	190.9	211.3	217.6	252.1	281.6	325.9	377.9	365.9	371.0	388.7
Source			518	229	229	229	229	229	229	229	229	229	229	229	229	229
			1000	1000	1000	1000	1000	1000	285	286	532	279	1000	1000	244	1000
						1000					1000	1000			1096	1096

Note: Figures in italics have been constructed.

Appendix 5a: Research totals, 1961-91 (contd.)

Total Number of FTE Researchers		1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	
Category	Name institute																	
Government	SRD/MOA	185	182	199	212.0	225	288	314.2	340.4	366.6	392.8	419						
	VRD/MOA	50	52	48	43	38	39	40	43.8	47.5	51.2	55						
	KARI-Muguga			76	99	88	74	90	99.5	99	71	80						
	KARI												547	525	503	486	532	
	Forestry/MNR	5.3	6	6	6	6	6	6	6	6	33	35	47	62	89	110	125	
	KEFRI																	
	Fisheries/MIT&WL	21.4	22.6	23.8	25.0													
	KMFERI					26.5	28	29.5	31	32.5	34	35	44	35	66	70	87	
Government subtotal		261.7	262.6	352.8	385.0	383.5	435.0	479.7	520.6	551.6	582.1	624.0	638.0	622.0	658.0	666.0	744.0	
Semi-public	TRF	9	9	9	4	4	4	4	8	12	11	12	12	13	13	13	13	
	CRF	15	17	20	21	18	21	16	21	21	17	17	22	25	22	24	25	
	NIB	11	11	11	10.6	10.2	9.8	9.4	9	8.6	8.2	7.8	7.4	7	7	7	7	
Semi-public subtotal	35.0	37.0	40.0	35.6	32.2	34.8	29.4	38.0	41.6	36.2	36.8	41.4	45.0	42.0	44.0	45.0		
Regional	EAAFRO	42	48															
	EAVRO	29	31															
Regional subtotal		71.0	79.0															
Academic	UN/FA	6.2	7.2	7.6	7.9	7.2	6.5	6.2	5.8	5.0	4	4	5	6	6	6	8	
	UN/EVS	2.8	2.7	2.7	2.7	3.0	3.3	3.1	2.8	3.2	3	3	6	6	3	3	2	
	UN/DBOT	1.1	1.0	1.0	1.0	1.0	1.1	1.1	1.2	1.2	1.0	2.0	1.0	1.0	3.0	2.0	2.0	
	UN/DZOO	0.8	0.7	0.7	0.7	0.8	0.8	0.7	0.7	0.7	0.7	1	1	1	1	1	1	
	UN/IDS	1.0	1.2	1.4	1.7	1.8	1.2	1.4	1.4	1.1	1.2	1	1	1	3	2	2	
	MU/FFR&WM											0.7	0.8	0.9	1.0	1.3	1.5	2.1
	MU/DBOT														0.2	0.3	0.4	0.5
	MU/DZOO														0.3	0.3	0.3	0.4
	MU/SES														0.2	0.2	0.2	0.6
	Egerton														4.2	4.7	6.5	6.5
KU/KUCAT	KU/DB	0.3	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.8	0.7	0.7	0.6	0.8
	KU/DZ	12.4	13.8	14.6	15.1	14.8	13.8	13.4	12.4	12.3	11.7	13.0	21.7	26.6	28.2	26.9	29.6	
	Academic subtotal	380.1	392.4	407.4	435.7	430.5	483.6	522.5	571.1	605.5	630.0	673.8	701.1	693.6	728.2	736.9	818.6	
TOTAL	229	229	229	280, 292	242, 292	51	27, 33	280, 280	235	280	999	780	925	925	999	999	999	
Source	1000	243	1094	1000	51, 1081	1000	1000	280	1000	976	1000	999	999	999	1000	1000	1000	
		1096	1096	1094	1094	1094	1094	1094	1094	1094	1094	1094	1000	1000	1000	1000	1000	

Note: Figures in italics have been constructed.

Appendix 5b: Expenditure totals, 1961-91

Total Research Expenditures		Currency, million Kenyan Shillings														
Category	Name	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Government	SRD/MOA	9.727	12.481	12.943	12.518	12.183	15.646	17.311	14.623	18.809	24.295	28.721	38.453	39.798	39.289	44.798
	VRD/MOA	3.558	4.327	4.321	5.001	3.602	4.733	5.631	5.045	5.497	6.517	8.173	9.685	16.376	16.771	18.552
	KARI=Muguga															
	KARI															
	Forestry/MNR	0.930	1.019	0.911	0.820	0.725	0.726	0.710	0.689	1.043	1.614	1.618	1.279	1.033	0.764	0.993
	KEFERI	0.190	0.221	0.212	0.400	0.694	1.160	1.703	1.784	2.142	2.718	3.000	3.379	5.181	5.233	7.081
	KMFERI															
Government subtotal		14.405	18.048	18.386	18.739	17.204	22.265	25.355	22.141	27.491	35.143	41.512	52.797	62.388	62.058	71.424
Semi-public	TRF	1.000	1.000	1.000	1.000	1.277	1.600	1.743	1.570	1.992	2.833	2.700	2.661	2.621	2.939	3.349
	CRF	2.805	3.760	3.975	4.463	4.141	4.903	5.607	5.700	5.334	5.813	6.381	6.699	7.390	7.596	8.528
	NIB						0.522	1.187	3.287	3.319	3.307	3.151	3.534	3.944	4.428	3.823
Semi-public subtotal		3.805	4.760	4.975	5.463	5.418	7.025	8.538	10.558	10.646	11.953	12.232	12.893	13.955	14.963	15.701
Regional	EAAFRO	5.126	6.361	6.445	6.386	6.805	8.274	10.573	11.249	12.117	12.973	12.301	13.451	12.701	10.380	12.650
	EAVRO	3.323	3.813	3.590	4.575	4.748	5.296	4.601	6.366	6.846	6.987	6.540	7.665	7.728	8.128	10.183
Regional subtotal		8.449	10.174	10.035	10.961	11.554	13.570	15.173	17.615	18.963	19.959	18.841	21.116	20.429	18.507	22.833
Academic	UN/FA		0.057	0.095	0.133	0.165	0.169	0.168	0.229	0.288	0.400	0.280	0.316	0.387	0.468	0.541
	UN/EVS		0.034	0.054	0.075	0.073	0.088	0.101	0.096	0.089	0.094	0.073	0.116	0.175	0.204	0.227
	UN/DBOT		0.021	0.040	0.060	0.042	0.042	0.040	0.056	0.071	0.100	0.080	0.080	0.089	0.100	0.108
	UN/DZOO							0.249	0.382	0.510	0.737	0.611	0.367	0.135	0.199	0.269
	UN/IDS															
	MU/FFR&WM															
	MU/DBOT															
	MU/DZOO															
	MU/SES															
	Egerton															
	KU/JKUCAT															
	KU/DB															
	KU/DZ															
Academic subtotal		0.000	0.112	0.190	0.268	0.280	0.298	0.559	0.764	0.958	1.331	1.168	1.069	1.350	2.256	2.907
Total (current LCU)		26.659	33.093	33.587	35.432	34.456	43.158	49.624	51.077	58.058	68.387	73.753	87.875	98.121	97.784	112.865
GDP Deflator		20.5	24.4	23.8	23.6	23.1	23.5	24.1	24.5	24.4	28.2	25.6	25.6	28.2	32.9	36.7
Total (constant 1985 LCU)		129.832	135.770	141.308	150.441	149.085	183.594	206.283	208.664	237.522	242.265	288.465	343.079	347.384	297.075	307.950
Total (constant 1985 PPP dollars)		22.364	23.387	24.341	25.914	25.680	31.625	35.533	35.943	40.914	41.731	49.689	59.096	59.838	51.172	53.045
Expat costs included in the total (constant 1985 PPP dollars)		8.667	8.915	9.081	8.846	9.543	11.692	11.790	11.616	12.943	13.760	15.451	17.087	15.609	12.456	12.627
Source				229	229	229	589	229	229	229	229	589	229	1173	229	1173

Appendix 5b: Expenditure totals, 1961-91 (contd.)

Total Research Expenditures		Currency: million Kenyan shillings															
Category	Name institute	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Government	SRD/MOA	50.028	60.223	89.678	91.810	85.509	118.687	128.799	140.127	150.316	158.241	167.465					
	VRD/MOA	20.826	27.379	24.110	31.578	22.367	26.142	30.267	34.372	38.503	42.346	46.844					
	KARI-Muguga			36.972	39.363	49.431	48.439	63.719	78.472	82.880	66.753	69.173					
	KARI												313.495	353.468	398.231	462.451	611.840
	Forestry/MNR	1.349	1.775	1.832	1.937	2.127	2.351	2.617	2.922	3.219							
	KEFRI										22.397	28.470	49.402	75.600	52.697	58.916	68.319
	Fisheries/MT&WL	7.334	9.700	11.352	14.591												
	KIMFRI					11.561	13.503	15.834	18.580	21.461	24.293	29.409	28.308	34.576	53.014	45.406	71.212
Government subtotal		79.536	99.077	163.943	179.280	170.995	209.121	241.237	274.474	296.379	314.029	341.361	391.205	463.644	503.943	566.773	751.370
Semi-public	TRF	3.764	3.918	5.652	2.766	2.472	2.752	4.211	6.473	7.825	9.887	11.592	12.478	14.741	16.262	18.224	20.253
	CRF	11.337	14.512	16.670	17.093	14.943	15.567	18.265	23.781	32.351	35.876	53.943	56.360	69.611	77.849	85.271	94.398
	NIB	6.458	8.178	8.439	8.477	8.816	9.406	9.839	10.283	10.553	10.580	10.604	10.218	10.050	10.982	12.112	13.616
Semi-public subtotal		21.558	26.608	30.761	28.335	26.230	27.724	32.316	40.537	50.729	56.343	76.139	79.056	94.402	105.093	115.607	128.267
Regional	EAAERO	14.225	17.796														
	EAVRO	14.075	16.373														
Regional subtotal		28.300	34.169														
Academic	UN/FA	2.825	3.675	3.895	4.175	4.173	4.234	4.302	4.341	4.322	3.354	3.978	6.600	6.976	7.253	8.239	10.355
	UN/FS	0.732	0.797	0.762	0.741	0.844	0.977	1.009	1.039	1.361	1.645	1.685	2.521	2.407	2.244	2.264	1.317
	UN/DBOT	0.377	0.403	0.377	0.358	0.425	0.516	0.569	0.629	0.751	0.864	1.049	1.210	1.255	1.737	1.785	1.826
	UN/DZOO	0.170	0.201	0.210	0.225	0.246	0.282	0.272	0.256	0.334	0.509	0.494	0.563	0.502	0.577	0.682	0.714
	UN/IDS	0.374	0.534	0.650	0.793	0.926	0.522	0.650	0.521	0.659	0.900	0.900	1.000	1.774	1.300	1.246	1.777
	MU/FFR&WM										0.601	0.773	0.939	1.155	1.658	2.266	3.294
	MU/DBOT													0.240	0.367	0.520	0.784
	MU/DZOO													0.295	0.323	0.356	0.659
	MU/SES													0.246	0.242	0.237	0.918
	Egeton												4.238	4.799	7.274	8.023	9.019
	KU/JKUCAT												1.199	1.628	2.135	2.747	3.529
	KU/DB	0.117	0.210	0.292	0.283	0.283	0.287	0.332	0.386	0.461	0.539	0.653	0.760	0.792	0.830	0.876	1.125
	KU/DZ	0.193	0.240	0.262	0.282	0.314	0.360	0.360	0.356	0.393	0.425	0.549	0.669	0.911	1.197	1.542	1.733
Academic subtotal		4.788	6.060	6.448	6.857	7.212	7.179	7.495	7.528	8.281	8.838	10.081	19.699	22.980	27.136	30.781	37.051
Total (current LCU)		134.181	165.915	201.152	214.472	204.437	244.024	281.047	322.539	355.389	379.210	427.581	489.960	581.026	636.172	713.161	916.688
GDP Deflator		43.6	51.0	52.6	55.6	61.1	67.5	75.1	83.9	92.4	100.0	108.9	114.8	124.6	136.2	150.2	168.9
Total (constant 1985 LCU)		307.981	325.525	382.482	385.638	334.817	361.547	374.103	384.494	384.532	379.210	392.791	426.857	466.176	467.103	474.775	542.838
Total (constant 1985 PPP dollars)		53.051	56.073	65.884	66.427	57.673	62.277	64.440	66.230	66.237	65.320	67.659	73.527	80.300	80.460	81.781	93.505
Expat costs included in the total (constant 1985 PPP dollars)		13.165	12.191	10.170	9.562	9.194	9.857	9.359	9.302	8.107	7.858	7.551	8.580	8.179	8.211	8.137	8.228
Source		229	229	229	229	280,292	51	1094	280	1086	280	999	999	999	999	999	999
		1173	1173	1173	1173	1081	1174	1174	1094	1094	999	1087	1174	1174	1174	1174	1174
						1174	1174	1174	1174	1174	1174	1174	1174	1174	1174	1174	1174

Appendix 6: Research staff development by institute

Institute: Scientific Research Division, MOA																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD			2	2	2	1	2	3	2	2	4	4	6	9	10	8
MSC			3	3	5	8	15	14	17	22	28	44	52	54	60	60
BSc			6	10	10	15	20	23	34	41	57	70	65	71	79	74
Subtotal	6	9	11	15	17	24	37	40	53	65	89	118	123	134	149	142
Expatriates	42	44	46	36	41	49	47	34	43	45	55	74	63	46	59	43
Total	48	53	57	51	58	73	84	74	96	110	144	192	186	180	208	185
Source			229	229	229	229	229	229	229	229	229	229	229	229	229	229
Nationals	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
PhD	8	8														
MSC	59	77														
BSc	81	81														
Subtotal	148	166	178	191	253	281	309	338	366	394						
Expatriates	34	33	34	34	35	33	31	29	27	25						
Total	182	199	212	225	288	314	340	367	393	419						
Source	229	229		1081	51					780						

Institute: Veterinary Research Department, MOA																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD			1	1	1	0	0	0	0	0	0	0	1	2	2	3
MSC			0	1	3	3	3	4	4	4	5	6	5	6	4	5
BSc			2	4	4	4	5	5	4	4	7	7	5	6	7	17
Subtotal	1	2	3	6	8	7	8	9	8	8	12	13	11	14	13	25
Expatriates	19	19	19	21	16	19	16	20	23	27	30	33	33	36	25	25
Total	20	21	22	27	24	26	24	29	31	35	42	46	44	50	38	50
Source			229	229	229	229	229	229	229	229	229	229	229	229	229	229
Nationals	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
PhD	3	1														
MSC	5	8														
BSc	23	24														
Subtotal	31	33	28	23	24	25	30	35	40	45						
Expatriates	21	15	15	15	15	15	14	12	11	10						
Total	52	48	43	38	39	40	44	48	51	55						
Source	229	229		292	27					780						

Appendix 6: Research staff development by institute (contd.)

Institute: Forest Research Services, Ministry of Natural Resources																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD					0			0			0			1		
MSc					0			1			4			2		
BSc					0			2			5			1		
Subtotal	0	0	0	0	0	1.0	2.0	3	5.5	8	9	7.3	5.7	4	4.7	5.3
Expatriates	4.3	4.0	3.7	3.3	3	2.3	1.7	1	1	1	1	0.7	0.3	0	0	0
Total	4.3	4.0	3.7	3.3	3	3.3	3.7	4	6.5	9	10	8.0	6.0	4	4.7	5.3
Source					286			285		532	279			244		
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD	1			1												
MSc	5			5												
BSc	0			0												
Subtotal	6	6	6	6	6	6	6	6								
Expatriates	0	0	0	0	0	0	0	0								
Total	6	6	6	6	6	6	6	6								
Source	243			242												

Note: In 1959 FRS employed 5 researchers (source 0287).

Institute: Fisheries Research Division, Fisheries Department, Ministry of Tourism and Wildlife																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD																
MSc																
BSc																
Subtotal																
Expatriates																
Total	1	1	1	1.9	3.9	5.9	7.7	9.6	11.5	13.4	15.2	16.5	17.7	18.9	20.1	21.4
Source																
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD																
MSc																
BSc																
Subtotal																
Expatriates																
Total	22.6	23.8	25.0													
Source																

Appendix 6: Research staff development by institute (contd.)

Institute: KARI-Muguga	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD		6														
MSc		10														
BSc		31														
Subtotal		47	74	64	53	68	75.5	80	56	65						
Expatriates		29	25	24	21	22	24	19	15	15						
Total		76	99	88	74	90	99.5	99	71	80						
Source		1094	1094	1094	1094	1094	1094	1094	1094	780						
		229	280	292	51	33	280	976								

Institute: Kenya Agricultural Research Institute	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD											25		23	30	32	
MSc											226		206	177	216	
BSc											246		224	229	234	
Subtotal											497		453	436	482	
Expatriates											50		50	50	50	
Total											547		503	486	532	
Source											780		1097	999	999	

Institute: Kenya Forestry Research Institute (KEFRI)	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD											2	3	5	5	5	
MSc											10	14	20	26	31	
BSc											22	32	51	66	76	
Subtotal											30	49	76	97	112	
Expatriates											3	13	13	13	13	
Total											33	62	89	110	125	
Source											922	976	999	999	999	

Appendix 6: Research staff development by institute (contd.)

Institute: Kenya Marine and Fisheries Research Institute (KMFI)																
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD					1				1	1	1	0	0	1	2	
MSc					12				13	15	15	14	25	29	32	
BSc					17				17	24	24	20	40	39	51	
Subtotal					30				31	40	40	34	65	69	85	
Expatriates					4				4	4	4	1	1	1	2	
Total				26.5	28.0	29.5	31.0	32.5	34	35	44	35	66	70	87	
Source									999	999	999	999	999	999	999	

Institute: Coffee Research Foundation (CRF)																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD			1	1	1	1	1	2	2	2	3	3	3	4	2	2
MSc			0	0	1	1	0	0	0	1	1	4	2	2	5	6
BSc			1	1	0	0	1	1	2	1	1	3	3	5	3	3
Subtotal			2	2	2	2	2	3	4	4	5	10	8	11	10	11
Expatriates	7	8	8	9	14	15	19	18	15	16	14	13	15	7	5	4
Total	8	9	10	11	16	17	21	21	19	20	19	23	23	18	15	15
Source			229	229	229	229	229	229	229	229	229	229	229	229	229	229
Nationals																
PhD	2	3		4		1			1	1	1	1	1	2	1	
MSc	8	10		6		10			12	13	15	17	15	17	20	
BSc	3	3		7		4			4	3	6	7	6	5	4	
Subtotal	13	16	18.5	17	18	15	18	19.5	17	17	22	25	22	24	25	
Expatriates	4	4	2.5	1	3	1	3	1.5	0	0	0	0	0	0	0	
Total	17	20	21	18	21	16	21	21	17	17	22	25	22	24	25	
Source	229	229	292	242	51	33	235	280	999	999	999	999	999	999	999	

Appendix 6: Expenditure totals, 1961-91 (contd.)

Institute: Tea Research Foundation Kenya (TRFK)																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD			0	0	0	0	0	0	0	0	0	0	0	0	0	0
MSc			0	0	0	0	0	0	0	1	2	2	2	2	2	2
BSc			0	0	0	1	1	1	1	1	0	0	0	0	1	1
Subtotal	0	0	0	0	0	1	1	1	1	2	2	2	2	2	3	3
Expatriates	2	2.5	3	4	5	5	5	4	5	5	5	3	5	5	5	6
Total	2	2.5	3	4	5	6	6	5	6	7	7	5	7	7	8	9
Source			229	229	229	229	229	229	229	229	229	229	229	229	229	229
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD	0	0		1		1			3	3	2	2	3	4	4	
MSc	2	2		2		2			5	5	5	5	4	4	4	
BSc	1	1		1		1			2	3	5	5	5	4	4	
Subtotal	3	3		4		4			10	11	12	12	12	12	12	
Expatriates	6	6	0	0	0	0	1	1	1	1	0	1	1	1	1	
Total	9	9	4	4	4	4	8	12	11	12	12	13	13	13	13	
Source	229	229	292	51		33		280	999	999	999	999	999	999	999	

Institute: National Irrigation Board (NIB)																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD						0	0	0	0	0	0	0	0	0	0	0
MSc						0	0	0	0	0	0	0	0	0	0	0
BSc						1	1	2	3	3	4	4	4	6	5	4
Subtotal						1	1	2	3	3	4	4	4	6	5	4
Expatriates						1	3	4	5	7	7	8	10	9	9	7
Total						2	4	6	8	10	11	12	14	15	14	11
Source						229			229	229	229	229	229	229	229	229
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD	0	0										0				
MSc	0	0										2				
BSc	4	4										4				
Subtotal	4	4		4.4	4.6	4.8	5	5.2	5.4	5.6	5.8	6	6	6	6	
Expatriates	7	7	6.4	5.8	5.2	4.6	4	3.4	2.8	2.2	1.6	1	1	1	1	
Total	11	11	10.6	10.2	9.8	9.4	9	8.6	8.2	7.8	7.4	7	7	7	7	
Source	229	229										925				

Appendix 6: Expenditure totals, 1961-91 (contd.)

Institute: East African Agricultural and Forestry Research Organization (EAAERO)																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD			0	0	1	1	1	1	1	2	3	3	4	7	7	7
MSc			0	0	0	1	3	4	2	1	0	0	1	7	8	10
BSc			3	3	3	3	2	1	2	2	2	5	4	15	16	15
Subtotal	1.5	2.3	3	3	4	5	6	6	5	5	5	8	9	29	31	32
Expatriates	21.0	21.5	22	22	25	30	39	39	42	43	39	33	28	14	11	10
Total	22.5	23.8	25	25	29	35	45	45	47	48	44	41	37	43	42	42
Source			229	229	229	229	229	229	229	229	229	229	229	1096	1096	1096
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD	7															
MSc	10															
BSc	16															
Subtotal	33															
Expatriates	15															
Total	48															
Source	1096															

Institute: East African Veterinary Organization (EAVRO)																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD	0	0	0	0	0	0	0	1	1	2	2	1	0	0	0	0
MSc	0	0	0	0	0.5	1	1	0	0	0	1	0	3	4	3	3
BSc	0	0	0	0	0	0	1	1	1	2	3	3	1	1	1	1
Subtotal	0	0	0	0	0.5	1	2	2	2	4	6	4	4	5	4	4
Expatriates	15	14.5	14	18	19.0	20	11	18	20	19	22	25	21	22	26	25
Total	15	14.5	14	18	19.5	21	13	20	22	23	28	29	25	27	30	29
Source			229	518		229	229	229	229	229	229	229	229	229	229	229
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD	0															
MSc	3															
BSc	3															
Subtotal	6															
Expatriates	25															
Total	31															
Source	229															

Note: In 1959 EAVRO employed 16 researchers (source 0287).

Appendix 6: Expenditure totals, 1961-91 (contd.)

Institute: Institute of Development Studies, University of Nairobi																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD							1	1.0	1.0	1	2	3.0	4	2.5	1	2
MSc							0	2.3	4.7	7	3	2.0	1	1.5	2	2
BSc							1	1.3	1.7	2	1	0.5	0	0.0	0	0
Subtotal							2	4.7	7.3	10	6	5.5	5	4.0	3	4
Expatriates							7	9.7	12.3	15	15	8.0	1	2.5	4	4
Total							9	14.3	19.7	25	21	13.5	6	6.5	7	8
FTE							1.1	1.7	2.4	3.0	2.5	1.6	0.7	0.8	0.8	1.0
Source							1000			1000	1000		1000		1000	1000
							1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD	2.0	2.0	2	2.0	5	5.0	9	9.0	8	9	9	9	9	8	8	
MSc	3.3	4.7	6	6.3	4	4.3	0	0.3	0	1	1	5	5	5	5	
BSc	0.0	0.0	0	1.0	0	1.0	0	1.0	1	3	3	3	3	2	2	
Subtotal	5.3	6.7	8	9.3	9	10.3	9	10.3	9	13	13	17	17	15	15	
Expatriates	4.7	5.3	6	6.0	1	1.0	0	0.0	0	0	0	2	2	2	2	
Total	10.0	12.0	14	15.3	10	11.3	9	10.3	9	13	13	19	19	17	17	
FTE	1.2	1.4	1.7	1.8	1.2	1.4	1.1	1.2	1	1	1	3	3	2	2	
Source			1000		1000		1000		999	999	999	999	999	999	999	

Note: For the years 1967-84, the percentage of faculty time spent on research was estimated at 12%. This 12% is the average of the observations for 1985-91.

Institute: Faculty of Forestry, Resources and Wildlife Management, Moi University																
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD									6	5.7	5.3	5	7.0	9	15	
MSc									3	4.7	6.3	8	7.0	6	9	
BSc									0	0.0	0.0	0	0.5	1	0	
Subtotal									9	10.3	11.7	13	14.5	16	24	
Expatriates									1	1.3	1.7	2	4.0	6	6	
Total									10	11.7	13.3	15	18.5	22	30	
FTE									0.7	0.8	0.9	1.0	1.3	1.5	2.1	
Source									1000			1000		1000	1000	

Appendix 6: Expenditure totals, 1961-91 (contd.)

Institute: Department of Botany, Faculty of Sciences, University of Nairobi																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD		1	1.0	1	1	1.5	2	3.0	4.0	5	4	4.5	5	4.5	4	4
MSc		0	0.0	0	0	0.0	0	0.0	0.0	0	0	0.0	0	0.5	1	1
BSc		0	0.0	0	0	0.5	1	0.7	0.3	0	0	0.0	0	0.0	0	2
Subtotal		1	1.0	1	1	2.0	3	3.7	4.3	5	4	4.5	5	5.0	5	7
Expatriates		1	2.0	3	3	3.0	3	2.3	1.7	1	1	2.5	4	4.0	4	5
Total		2	3.0	4	4	5.0	6	6.0	6.0	6	5	7.0	9	9.0	9	12
FTE		0.2	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.6	0.8	0.8	0.8	1.1
Source		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD	5.3	6.7	8	8.0	8	7.0	6									
MSc	0.7	0.3	0	0.5	1	2.5	4									
BSc	1.7	1.3	1	0.5	0	0.5	1									
Subtotal	7.7	8.3	9	9.0	9	10.0	11	10.0	9	14	14	12	12	21	21	
Expatriates	4.0	3.0	2	2.5	3	2.5	2	3.0	4	5	5	5	5	4	4	
Total	11.7	11.3	11	11.5	12	12.5	13	13.0	13	19	19	17	17	25	25	
FTE	1.0	1.0	1.0	1.0	1.1	1.1	1.2	1.2	1.0	2.0	1.0	1.0	3.0	2.0	2.0	
Source			1000		1000		1000		999	999	999	999	999	999	999	

Note: For the years other than 1985-91, the percentage of faculty time spent on research was estimated at 9%. This 9% is the average of the observations for the years 1985-91.

Institute: Department of Zoology, Faculty of Science, University of Nairobi																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD		0	0.0	0	1	1.5	2	3.3	4.7	6	6	6.0	6	5.5	5	9
MSc		0	0.0	0	0	0.0	0	0.0	0.0	0	0	0.0	0	0.0	0	0
BSc		0	0.0	0	0	0.0	0	0.0	0.0	0	1	1.0	1	0.5	0	2
Subtotal		0	0.0	0	1	1.5	2	3.3	4.7	6	7	7.0	7	6.0	5	11
Expatriates		3	6.0	9	6	5.5	5	6.7	8.3	10	8	8.0	8	8.5	9	8
Total		3	6.0	9	7	7.0	7	10.0	13.0	16	15	15.0	15	13.0	11	19
FTE		0.1	0.2	0.4	0.3	0.3	0.3	0.4	0.5	0.6	0.6	0.6	0.6	0.5	0.4	0.8
Source		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD	8.7	8.3	8	7.5	7	7.0	7	5.5	4	7	7	9	9	9	9	
MSc	0.0	0.0	0	1.0	2	2.5	3	4.5	6	6	6	7	7	7	7	
BSc	1.7	1.3	1	2.0	3	2.5	2	2.0	2	2	2	2	2	2	2	
Subtotal	10.3	9.7	9	10.5	12	12.0	12	12.0	12	15	15	18	18	18	18	
Expatriates	8.3	8.7	9	8.5	8	6.5	5	6.5	8	8	8	6	6	6	6	
Total	18.7	18.3	18	19.0	20	18.5	17	18.5	20	23	23	24	24	24	24	
FTE	0.7	0.7	0.7	0.8	0.8	0.7	0.7	0.7	1	1	1	1	1	1	1	
Source			1000		1000		1000		999	999	999	999	999	999	999	

Appendix 6: Research staff development by institute (contd.)

Institute: Institute of Development Studies, University of Nairobi		1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																	
PhD								1	1.0	1.0	1	2	3.0	4	2.5	1	2
MSc								0	2.3	4.7	7	3	2.0	1	1.5	2	2
BSc								1	1.3	1.7	2	1	0.5	0	0.0	0	0
Subtotal								2	4.7	7.3	10	6	5.5	5	4.0	3	4
Expatriates								7	9.7	12.3	15	15	8.0	1	2.5	4	4
Total								9	14.3	19.7	25	21	13.5	6	6.5	7	8
FTE								1.1	1.7	2.4	3.0	2.5	1.6	0.7	0.8	0.8	1.0
Source								1000			1000	1000		1000		1000	1000
								1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																	
PhD								9	9.0	8	9	9	9	9	8	8	
MSc								0	0.3	0	1	1	5	5	5	5	
BSc								0	1.0	1	3	3	3	3	2	2	
Subtotal								9	10.3	9	13	13	17	17	15	15	
Expatriates								0	0.0	0	0	0	2	2	2	2	
Total								9	10.3	9	13	13	19	19	17	17	
FTE								1.1	1.2	1	1	1	3	3	2	2	
Source								1000		999	999	999	999	999	999	999	

Note: For the years 1967-84, the percentage of faculty time spent on research was estimated at 12%. This 12% is the average of the observations for 1985-91.

Institute: Faculty of Forestry, Resources and Wildlife Management, Moi University		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																	
PhD																	
MSc																	
BSc																	
Subtotal																	
Expatriates																	
Total																	
FTE																	
Source																	

Appendix 6: Research staff development by institute (contd.)

Institute: Department of Botany, Faculty of Science, Moi University	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD												1	2.5	4	5	
MSc												2	1.5	1	3	
BSc												0	0.0	0	0	
Subtotal												3	4.0	5	8	
Expatriates												1	1.5	2	2	
Total												4	5.5	7	10	
FTE												0.2	0.3	0.4	0.5	
Source												1000		1000	1000	

Note: Faculty time spent on research was estimated at 5%.

Institute: Department of Zoology, Faculty of Science, Moi University	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD												3	4.0	5	4	
MSc												3	1.5	0	3	
BSc												0	0.5	1	1	
Subtotal												6	6.0	6	8	
Expatriates												0	0.0	0	1	
Total												6	6.0	6	9	
FTE												0.3	0.3	0.3	0.4	
Source												1000		1000	1000	

Note: Faculty time spent on research was estimated at 5%.

Institute: School of Environmental Studies, Moi University	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD												4		2	10	
MSc												1		2	0	
BSc												0		0	0	
Subtotal												5	4.5	4	10	
Expatriates												0	0	0	2	
Total												5	4.5	4	12	
FTE												0.25	0.22	0.20	0.60	
Source												1000		1000	1000	

Note: Faculty time spent on research was estimated at 5%.

Appendix 6: Research staff development by institute (contd.)

Institute: Egerton University	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD													20			
MSC													75			
BSc													29			
Subtotal											80	90	124	0	0	
Expatriates											4	4	6	6	6	
Total											84	94	130	130	130	
FTE											4.2	4.7	6.5	6.5	6.5	
Source											1000	1000	1000			

Note: Egerton Agricultural College was upgraded to university status in 1987. Although staff members of Egerton probably conducted some research prior to 1987, we have not included the pre-1987 Egerton in our dataset. In the transformation from an agricultural college to a university the number of subjects taught was expanded considerably. In addition, some subjects such as economics and engineering are no longer exclusively agriculture oriented. For consistency we included the departments of economics and engineering in our agriculture count, but excluded the department of (agricultura) education. We assume that the percentage of faculty time spent on research at Egerton University is about 5%.

Institute: Jomo Kenyatta University College of Agriculture & Technology	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD																
MSC																
BSc																
Subtotal																
Expatriates																
Total											24	30	36	42	48	
FTE											1.2	1.5	1.8	2.1	2.4	
Source											925					

Note: It is our understanding that JKUCAT expanded rapidly over the past five years, so we assumed that the departments relevant to agriculture doubled in size between 1987 and 1991.

Appendix 6: Research staff development by institute (contd.)

Institute: Department of Botany, Kenyatta University																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD																5
MSc																0
BSc																0
Subtotal																5
Expatriates																1
Total																6
FTE																0.3
Source																1000
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD		5			4		6		6		9			8		7
MSc		0			2		0		2		4			3		7
BSc		0			1		0		0		0			0		1
Subtotal		5		6.3	7	6.5	6	7	8	10.5	13	12.3	11.7	11	15	15
Expatriates		3		3	2	2.5	3	3	3	2.5	2	2	2	2	1	1
Total		8		9.3	9	9	9	10	11	13	15	14.3	13.7	13	16	16
FTE		0.40		0.47	0.45	0.45	0.45	0.50	0.55	0.65	0.75	0.72	0.68	0.65	0.80	0.80
Source		1000			1000		1000		1000		1000			1000		1000

Note: Faculty time spent on agricultural research was estimated at 5%.

Institute: Department of Zoology, Kenyatta University																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD																4
MSc																0
BSc																0
Subtotal																4
Expatriates																4
Total																8
FTE																0.4
Source																1000
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD		7			6		6		4		5			11		10
MSc		1			0		1		3		5			15		16
BSc		1			0		0		0		1			0		0
Subtotal		9		7	6	6.5	7	7	7	9	11	16	21	26	26	26
Expatriates		3		3.3	4	3	2	2	2	2	2	1.3	0.7	0	0	0
Total		9.5		10.3	10	9.5	9	9	9	11	13	17.3	21.7	26	26	26
FTE		0.48		0.52	0.50	0.48	0.45	0.45	0.45	0.55	0.65	0.87	1.08	1.30	1.30	1.30
Source		1000			1000		1000		1000		1000			1000		1000

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