

Statistical Brief

No. 13

September 1994

**Statistical Brief on the National Agricultural Research System**  
**of**  
**NAMIBIA**

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ISNAR INDICATOR SERIES PROJECT: PHASE II  
International Service for National Agricultural Research  
with support from  
the Government of Italy  
and  
Special Program for African Agricultural Research (SPAAR)

## 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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**Acknowledgments**

The authors thank Fionnuala Hawes for her assistance in preparing the graphics for this report and general secretarial support to the project. Helpful comments and assistance with data gathering were obtained from A.J. Coetzee, J.P. Venter, M. Dagg, P. Eyzaguirre, C. Hoste, and B. Nestel.



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# Acronyms

ASWA	Administration of South-West Africa	NDC	Namibian Development Corporation
CGIAR	Consultative Group on International Agricultural Research	NEPRU	Namibian Economic Policy Research Unit
CVL	Central Veterinary Laboratory	NISER	Namibian Institute for Social and Economic Research
DAI	Division of Agricultural Investigation	OECD	Organization for Economic Co-operation and Development
DERU	Desert Ecological Research Unit	PPP	Purchasing Power Parity
DF	Directorate of Forestry	RD	Research Division
FTE	Full-time Equivalent	RSAD	Research and Stock Assessment Division
FINNIDA	Finnish International Development Agency	SACCAR	Southern African Center for Cooperation in Agricultural Research
FNDC	First National Development Cooperation	SADCC	Southern African Development Coordination Conference
ISNAR	International Service for National Agricultural Research	SEFREF	Sea Fisheries Research Fund
MAWRD	Ministry of Agriculture, Water and Rural Development	SFRI	Sea Fisheries Research Institute
MFMR	Ministry of Fisheries and Marine Resources	SWA	South-West Africa
MWCT	Ministry of Wildlife, Conservation and Tourism	UN	United Nations
NARS	National Agricultural Research System		

## 1. Introduction

The primary purpose of this brief is to provide various statistical and institutional details on the development and current status of the public agricultural research system in Namibia. 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 Namibian 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 Namibia we refer to appendix 1.

## 2. Agricultural Research Institutions

### 2.1 Historical Evolution<sup>1</sup>

Namibia, or South-West Africa (SWA) as it was once called, was colonized by Germany in 1884. Following World War I, however, Germany lost control of all her African colonies. They were placed under the direct administration of various countries with oversight by the League of Nations, the predecessor of the United Nations (UN). As a consequence of this process the administration of SWA was mandated to the Union of South Africa, which was a British colony at that time. After the political independence of South Africa in 1934, SWA remained under the administration of South Africa. From the 1960s onwards political pressure was put on South Africa to give SWA political independence. In 1964 the UN voted to end the South African mandate over SWA and in 1968 they voted again to rename the territory Namibia. Finally, after many years of opposition and armed resistance, the South African government installed a transitional government in Namibia in June 1985 which eventually led to Namibia's political independence in 1990.

The first agricultural research activities in Namibia were initiated during the German colonial period. Since Namibia consists mainly of arid, poorly vegetated areas, much of the early research focused on the introduction of tree species. Forestry research began in 1894 with the development of a small plot near Windhoek for experimental purposes. Some crop and livestock research were also initiated around this time. Crop research focused on the introduction of various crops that could be grown under the local, rather harsh, conditions, while livestock research was mainly concerned with identifying and controlling animal diseases and importing improved breeds of livestock from Germany to upgrade the quality of the local stock. The first agricultural/forestry experiment station was established at Brakwater by the colonial administration in 1900. Its main task was to introduce new timber and fruit tree species. Within a few years, several other agricultural/forestry stations were established by the colonial administration, and by 1912/1913 some 10 plantations and (research) stations were in operation throughout the country conducting research on trees, fruit, vines, date palms, tobacco, wheat, fodder, karabul breeding, cattle, and sheep. The main tasks of these plantations and stations were to produce saplings and seedlings and/or pure seeds to be sold or distributed throughout the country, experiment with certain types of crops and fruit and wood tree species in order to identify and breed those best suited for the soil and climate conditions of the region served by the station, produce foodstuffs and fodder for own consumption, and identify "exotics" - i.e., cash crops that could be developed for export markets. The South-West Africa Company also established and operated a similar type of station that engaged in some research including a large-scale afforestation project at Kreyfontein. By the time SWA was brought under the administration of South Africa, quite a substantial network of stations undertaking some agricultural research on crops, livestock, and forestry was in place. Only fisheries research did not get underway until after 1920.

During much of the seventy year period following 1920, when SWA was under the direct control of the Administration of South-West Africa (ASWA), the Agricultural Branch of the Administration had responsibility for the management and conduct of agricultural research. But there was, in fact, little agricultural research conducted throughout much of this period. Agricultural research and in particular forestry research was significantly curtailed and most of

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1 The material presented in this section draws largely from Venter (1991), FAO (1992), Lau and Reiner (1993), and ISNAR (1993).

the agricultural/forestry stations were abandoned. The small amount of crop research that was done involved mainly agronomic and horticultural research. The limited financial support for agricultural research that was forthcoming came principally from the Government of South Africa via ASWA.

Most of the livestock research being done during the period following 1920 took place on experiment stations that focused on the livestock production problems of the large commercial producers. The three largest stations were Omatjenne in the north, Neudamm in central SWA, and Gellapt-Ost in the south. Three additional research stations were eventually established at Kalahari in 1958, Uitkomst in 1960, and Sonop in 1962. These new stations concentrated mainly on livestock and some pasture research. Game research and crop research were also conducted at Sonop and Uitkomst, respectively. A further two research stations were established in 1972 at Mahenene and Katima Mulibo. They focused on crop research although some horticulture research was also carried out at Mahenene. Moreover, these two stations focused on the commercial sector, with little if any attention being given to the problems of the much larger group of small-scale communal farmers in the country.

As a consequence of Namibia's complete administrative integration into South Africa in 1968/69, the functions of the Agricultural Branch were assumed by the Department of Technical Services of the Ministry of Agriculture of South Africa. The fishery research station at Walvis Bay was also brought under South Africa's direct control and integrated into the Sea Fisheries Research Institute of South Africa. This administrative integration ceased in 1978/79 and the research facilities located in Namibia were transferred back to ASWA. The new administrative structure that was adopted by ASWA had many of the characteristics of the apartheid regime that operated in South Africa.

In 1980, the implementation of proclamation AG8 led to the division of agricultural responsibilities between the Central Authority and the 10 ethnic authorities of the homelands. Basic research was the responsibility of the Department of Agriculture and the Nature Conservation of the Central Authority, while the ethnic or so-called "second tier" authorities were assigned responsibility for applied research. Little research was actually conducted by these authorities. Each homeland had its own research experiment stations, but they were mainly run as breeding operations rather than research stations. An exception was the Administration for Whites, which conducted some agricultural research and bought four additional farms to investigate the options for diversifying farming operations. Research under the Central Authority was conducted by the Division of Agricultural Research of the Directorate of Agriculture and Forestry within the Department of Agriculture and Nature Conservation. The division provided research services to the homelands representative authorities and collected, processed, and published research results and statistics that related to agricultural development. The Department of Agriculture and Nature Conservation consisted of five directorates of which four conducted research: agriculture and forestry, nature conservation and recreational resorts, veterinary services, and sea fisheries.

With regard to fisheries research, the Sea Fisheries Research Institute (SFRI) of South Africa continued to execute the fisheries research for Namibia after 1978. Two of SFRI's six laboratories were located in Namibia (at Walvis Bay and Lüderitz). In 1989 all the research activities of SFRI concerning Namibia were transferred to the Directorate of Sea Fisheries and the research laboratory at Walvis Bay was relocated to Swakopmund.

Following political independence in 1990 the current national agricultural research system was set up with some attempts to shift the focus of agricultural research away from the commercial landholders toward the much larger group of small-scale subsistence farmers. More than 90% of Namibia's commercial agricultural production comes from livestock. As a result, livestock research still commands significantly more resources than crop research as reflected in the large number of livestock breeding stations as well as the experimental farms that focus on cattle, sheep, and goats.

Currently, crop and livestock research is largely conducted by the Division of Agricultural Investigation (DAI) within the Ministry of Agriculture, Water, and Rural Development (MAWRD). Forestry research is conducted by the Directorate of Forestry of MAWRD. In addition, wildlife research is the responsibility of the Research Division of the Ministry of Wildlife, Conservation and Tourism (MWCT), while fisheries research is within the Research and Stock Assessment Division of the Ministry of Fisheries and Marine Resources (MFMR). There is no organization or formal coordinating mechanism to link these institutions.

## **2.2 Present Structure**

As background to a description of the current structure of the Namibian agricultural research system this section begins with a brief overview of contemporary developments in the Namibian agricultural sector. Namibia has quite distinct commercial and communal agricultural sectors. The commercial sector is relatively well developed and capital intensive, consisting of about 4,200 farmers. Livestock accounts for 90% of the agricultural sector's total output (in value) and mainly takes place in the southern part of Namibia. Large-scale crop production is relative unimportant in the commercial sector.

The communal sector consists mainly of subsistence farming operations and is concentrated in the northern, rainfed areas. Traditional farming practices are used with little external inputs. The communal sector consists of 120,000 farmers which, when taken together, use a comparable amount of land as the 4,200 commercial farmers. They cultivate maize, millet, and legumes and engage in cattle and sheep production, which is also done mainly on a subsistence basis. The communal sector operates with some serious production constraints including a lack of well-developed property rights and limited access to external markets. The sector also engages in some poor production practices (e.g., overgrazing).

The current structure of the national agricultural research system of Namibia is presented in table 2. The Division of Agricultural Investigation (DAI) of the Ministry of Agriculture, Water and Rural Development (MAWRD) is the country's main agricultural research institute. It concentrates on livestock research, which accounts for 57% of the time of its researchers. DAI is a young institution that was formed by amalgamating a number of units within the Central Authority and the 10 Representative Authorities of the homelands. The Directorate of Agricultural Development inherited the research stations and demonstration sites of the ten homelands (29 stations/sites in total). In 1992 DAI had 19 research stations/sites under its jurisdiction. DAI is divided into five divisions: large livestock, small livestock, pasture science, agronomy and horticulture, and analytical services and herbarium. The present organizational structure of DAI is provided in diagrammatic form in appendix 3.

Although the first forestry research activities in the country date back to the early 1900s, no formal forestry research was being carried out in Namibia at the time of independence. Following independence a forestry research division was established within the Directorate of

Table 2: Overview of Present NARS Structure, 1992

Institutional category	Executing agency				Staffed research sites <sup>a</sup>	Number of researchers		
	Supervising agency	Name	Acronym	Research focus		National	Expats	Total
Government	Ministry of Agriculture, Water, and Rural Development	Directorate of Agricultural Development, Division of Agricultural Investigation	DAI	crops and livestock	19 (5)	2	21	21
		Directorate of Forestry, Research Division	DF	forestry	2 (2)	1	2	2
	Ministry of Fisheries and Marine Resources	Directorate of Veterinary Services, Central Veterinary Laboratory	CVL	animal health	3 (1)	0	1	1
		Directorate of Resource Management, Research and Stock Assessment Division	RSAD	fisheries	1 (1)	na	21	21
Semi-Public	Ministry of Wildlife, Conservation, and Tourism	Research Division	RD	wildlife, natural resources	8 (7)	na	20	20
		Namibian Economic Policy Research Unit	NEPRU	socioeconomic	1 (1)	na	9	na
Academic	University of Namibia	Namibian Institute of Social Economic Research	NISER	socioeconomic	1 (1)	na	10	na
<i>Total</i>					<i>35 (18)</i>	<i>na</i>	<i>84</i>	<i>na</i>

Source: 0999 and 1023.

Note: The information in this table refers to 1992, except for the Directorate of Forestry which pertains to 1991.

<sup>a</sup> Staffed with researchers and/or technicians. Bracketed sites are staffed with researchers.

Forestry (DF) of MAWRD. In 1992 DF's research staff consisted of only two professionals. In the north of Namibia trial plantings are underway to find species that are suitable for the production of firewood and building materials, as well as to identify species that will improve soil conditions and provide fodder. Permanent observation plots have been established to study regrowth and the impact of various forestry management practices on *Pterocarpus angolensis* (kiatt).

The Directorate of Veterinary Services of MAWRD conducts only a limited amount of research at the Central Veterinary Laboratory at Windhoek and some smaller laboratories at Gobabis and Grootfontein.

MAWRD is the ministry that conducts most of the country's crop, livestock, and forestry research. Fisheries research is conducted by the Research and Stock Assessment Division (RSAD) of the Ministry of Fisheries and Marine Resources (MFMR), which is headquartered at Swakopmund. Following independence, Namibia asserted jurisdiction over its marine fisheries that extended to the 200 mile limit allowed by international law. This led to a rapid increase in RSAD staff, which numbered 21 researchers by 1992. Fisheries research is divided into five commodity sections — demersal and pelagic marine fish, freshwater fish, crustaceans, mammals, and sea plants — and two additional sections, one which studies the physical environment and the other plankton supplies and intertidal flora and fauna. Large research vessels and up-to-date equipment are used to monitor deep-water stocks. Some work on fishing gear and freshwater fisheries is also conducted.

The Research Division (RD) of the Ministry of Wildlife, Conservation, and Tourism (MWCT) conducts wildlife research, as well as some natural resources research. Research is conducted at RD's headquarter at Windhoek, the Etosha Ecological Research Institute, and the Desert Ecological Research Institute, as well as regionally in the country's game parks. The main objective of the wildlife research is to study the size and status of the wildlife population and devise sustainable management practices. At present MWCT's research division comprises four sections: animal behavior and game park management, game on farms and game capture unit, problem animals, and wildlife legislation.

Agricultural education in Namibia is given by three Colleges, which currently provide training to diploma level. These are Ogongo College, Tsumis College, and Mashare College. The development of a local capacity to provide higher-level, tertiary education in agriculture is still in its infancy. Before independence, Namibian students went mainly to South Africa to pursue academic studies in agriculture. There is currently no agricultural faculty at the University of Namibia (established in August 1992), but there are plans to establish a faculty of Agriculture and Natural Resources in 1994.

Some agriculturally related research is carried out at the Namibian Institute of Social Economic Research (NISER), which is associated with the University of Namibia. NISER conducts research on issues concerned mainly with rural poverty and development problems. The Namibian Economic Policy Research Unit (NEPRU) also carries out socioeconomic research on rural development. NEPRU is an independent research unit located at Windhoek and is supported financially by the governments of Norway and Sweden. It conducts mainly short-term, project-type socioeconomic research.

In the private sector, not included in table 2, the First National Development Corporation (FNDC), established in 1978, formed an agricultural research station on the Musese farm in

1985. FNDC was renamed the Namibian Development Corporation (NDC) in 1993 and became a part of the Ministry of Trade and Industry. NDC conducts some agricultural research concerning commercial date cultivation, commercial rice production, and crop production research. Rössing Uranium established the Rössing Foundation in 1986. The Rössing Foundation carried out some research concerning rainfed agricultural production systems, but ceased its agricultural research activities in 1992.

### 3. NARS Statistics

A questionnaire response was only received from the Directorate of Forestry and combined with data from ISNAR's 1993 country review (ISNAR 1993) and other sources cited at the conclusion of this report. We have been unsuccessful in our efforts to compile statistical data for the period prior to 1990. Apparently the radical change in government structures that came with independence made the relevant data files and information inaccessible. Because no detailed information on expenditures and research staff was available for NISER and NEPRU, these two institutes are not included from the data reported in the remainder of this brief.

#### 3.1 Recent developments

Namibia has a relatively high intensity of agricultural research activity compared with most other sub-Saharan African countries. During the period 1990-92 Namibia spent between 2.4% and 3.5% of its agricultural GDP on agricultural research (table 3). In terms of researchers per million economically active agricultural population, Namibia has many more researchers than the 1981-85 sub-Saharan average of 42 (Pardey, Roseboom and Anderson 1991). However, high intensity ratios are quite common among countries with small populations. Neighboring Botswana, for example, spent the equivalent of 3.6% of its agricultural GDP on agricultural research and had 195 researchers per million economic active agricultural population in 1991. In relation to its agricultural land area, however, both Namibia and Botswana have relatively few researchers.

Table 3: *NARS Researcher and Expenditure Series, 1990-92*

	1990	1991	1992
Researchers (FTEs)	52.0	60.0	64.0
Expenditures (millions 1985 Rands)	9.261	9.933	12.386
Expenditures (millions 1985 PPP dollars) <sup>a</sup>	10.239	10.982	13.694
Expenditures per researcher (1985 PPP dollars) <sup>a</sup>	197,000	183,000	214,000
Economically active agricultural population (millions)	0.152	0.152	0.153
Researchers per million econ. active agr. population	343.0	393.7	417.2
AgGDP (millions 1985 PPP dollars) <sup>a</sup>	303.4	299.9	327.3
Expenditures as a % of AgGDP	2.42	2.60	3.48

*Source:* See appendices 5 and 6.

*Note:* Data include DAI, Directorate of Forestry, RSAD, and the Research Division of MWCT.

<sup>a</sup> For information on "PPP dollars" see appendix 2.

## 3.2 Human Resources

### *Degree and Nationality Status of Researchers*

Table 4 provides detailed information on the educational status of agricultural researchers. Unfortunately the breakdown by educational level for RSAD and RD includes both national and expatriate research staff because it was not possible to separately identify expatriates. In the period 1990-92, one and two expatriates were working at DF and DAI, respectively. In 1992, 59% of the national researchers held a postgraduate degree. None of DAI's researchers held a PhD degree, while more than half the postgraduates at RD were trained to doctoral level.

### *Gender*

In 1992, 21% of the DAI's national research staff were female (four out of 19 researchers). The two expatriates were both male. For DF, RSAD, and RD no information on gender was made available.

Table 4: *Educational and Nationality Status of Researchers*

Institute	Researcher status	1990	1991	1992
		<i>(full-time equivalents)</i>		
DAI, MAWRD	Nationals			
	PhD	1	1	0
	MSc	4	6	10
	BSc	7	10	9
	Subtotal	12	17	19
	Expatriates	2	2	2
	<i>Total</i>	<i>14</i>	<i>19</i>	<i>21</i>
DF, MAWRD	Nationals			
	PhD	0	1	1
	MSc	0	0	0
	BSc	0	0	0
	Subtotal	0	1	1
	Expatriates	1	1	1
	<i>Total</i>	<i>1</i>	<i>2</i>	<i>2</i>
RSAD, MFMR <sup>a</sup>	PhD	na	na	4
	MSc	na	na	6
	BSc	na	na	11
	<i>Total</i>	<i>17</i>	<i>19</i>	<i>21</i>
RD, MWCT <sup>a</sup>	PhD	na	na	8
	MSc	na	na	7
	BSc	na	na	5
	<i>Total</i>	<i>20</i>	<i>20</i>	<i>20</i>

Source: see appendix 6.

<sup>a</sup> Data include national and expatriate staff.

### *Staff Composition*

Table 5 provides a detailed breakdown of the staff structure at DAI for 1992. The technical support staff in Namibia is strong compared with many other African countries. Most of the research technicians at DAI have a two or three-year qualification from a technical college. Five research technicians have a three-year BSc degree. The number of technicians increased at the same pace as the number of researchers during the period 1990-92 so that the technician per researcher ratio was more or less constant at around 2.5. In addition there were 13.6 administrative and other support staff per researcher at DAI in 1992.

Table 5: *Staffing Structure, DAI*

Staff category	1990	1991	1992
	<i>(full-time equivalents)</i>		
Research <sup>a</sup>	14	19	21
Technical support <sup>b</sup>	36	47	53
Administrative support <sup>b</sup>	na	na	11
Other support	na	na	274
Sub-total support	na	na	338
<i>Total</i>	na	na	<i>359</i>

Source: 0999.

<sup>a</sup> Includes nationals and expatriates. Directors, deputy directors, and so on are included in this category if they have a research background. The financial director, however, is classified as administrative support staff.

<sup>b</sup> Technical and administrative support staff are defined as those staff that have at least a secondary education plus additional professional training or equivalent experience.

### **3.3 Financial Resources**

#### *Factor Mix*

Table 6 provides a breakdown of the total expenditures by cost category for the years 1990-92. Operating costs account for a substantial share of total expenditures, particularly when compared with other countries in the region which reported an average share of 25% for operating costs in 1981-85 (Pardey, Roseboom and Anderson 1991). This probably reflects the high operating costs incurred in maintaining 19 research stations for 21 researchers.

#### *Source of Funds*

Most of the funds for agricultural research come from the general revenues of the Government of Namibia channeled through MAWRD. Funds from foreign donors account for only a small fraction of the total funds going to research (ISNAR 1993). The livestock industry provides no direct financial support for agricultural research. For fisheries research the salaries of permanent staff and freshwater research operations are paid from general government revenues channeled through MFMR. Operational costs for marine research are financed by the Sea Fisheries Research Fund (SEFREF) which is maintained through a cess on all landed fish. The tax rate varies by species, but overall it is about 0.5% of the value of the landed catch. This provides fisheries research with a reasonably assured source of funding. There is no specific line item in the Government's budget for forestry research and no funds from foreign donors are invested in on-going forestry research projects. The only resources currently made available for forestry research are some technical assistance on research planning and programming provided

Table 6: *Cost Categories*

Institute	Cost category	1990	1991	1992
		<i>(percentages)</i>		
DAI, MAWRD	Personnel	63.8	41.9	49.4
	Operating	32.9	46.0	42.7
	Capital	3.3	12.1	7.9
	<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>
RSAD, MFMR	Personnel	na	45.7	51.3
	Operating	na	50.1	45.5
	Capital	na	4.2	3.2
	<i>Total</i>	<i>na</i>	<i>100</i>	<i>100</i>
RD, MWCT	Personnel	64.4	67.1	75.7
	Operating	34.8	32.1	24.2
	Capital	0.6	0.7	0.1
	<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>

Source: 1023 and 1079.

to Namibia as part of a project in the SADCC region on forestry and forest products research planning. This project is being done with the financial and professional support of the Finnish International Development Agency (FINNIDA).

### 3.4 Research Focus

The Namibian NARS differs from most others in the region in that fisheries research and research on national resources and wildlife stand out as the two major research interests of the system (see table 7). Crop, livestock, and forestry research receive far less attention. DAI, which focuses specially on crop and livestock research, spent 57% of its research time on livestock, 14% on crops, 19% on natural resources, and 10% on "other". The "other" category includes socioeconomic and farming systems research.

Since independence the emphasis of agricultural research has begun to shift from the commercial sector in the south towards the communal sector in the northern part of Namibia. For DAI, with its strong history of livestock research, this shift in focus will have major consequences. Currently, there are only three researchers (of whom two are expatriates) and six research technicians working on the crop production issues facing producers in the northern part of the country. The rest of DAI's research staff are livestock specialists.

Table 7: *Research Focus, 1992<sup>a</sup>*

Research area	DAI, MAWRD	DF, MAWRD	RSAD, MFMR	RD, MWCT	Total	
						Share
	<i>(full-time equivalents)</i>					%
Crops	3	0	0	0	3	4.7
Livestock	12	0	0	0	12	18.8
Forestry	0	2	0	0	2	3.1
Fisheries	0	0	21	0	21	32.8
Natural resources and wildlife	4	0	0	20	24	37.5
Other	2	0	0	0	2	3.1
<i>Total</i>	<i>21</i>	<i>2</i>	<i>21</i>	<i>20</i>	<i>64</i>	<i>100</i>

Source: 1023.

Note: The “natural resources and wildlife” 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, as well as botany and ecology.

<sup>a</sup> NEPRU and NISER are not included in these figures. Both organizations conduct some socioeconomic research related to agriculture.

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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.

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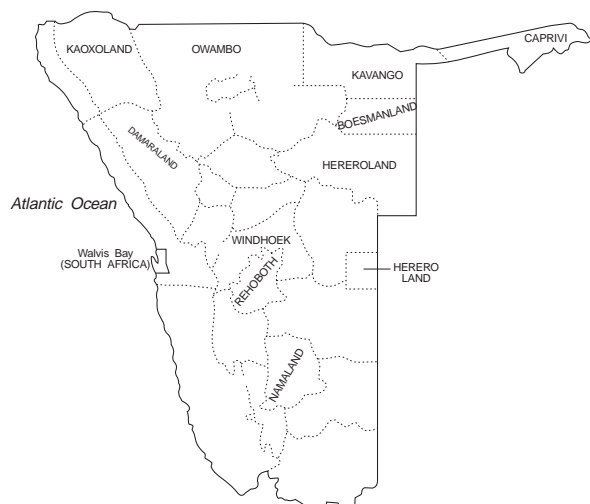
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## Appendix 1: Country background information



### Geography

Area: 82.4 million ha

Location: on the southwest coast of Africa. It is bordered by Angola and Zambia in the north, by Botswana in the east and by South Africa in the southeast and south. The Walvis Bay enclave remained part of South Africa after Namibia's independence in 1990, but was handed over to Namibia in early 1994.

Agroecological features: Namibia can be divided into 3 zones: the Namib Desert, the Central Plateau and the Kalahari Desert. The climate in Namibia is continental tropical and very dry. Average annual rainfall ranges from 100 mm in the Namib Desert in the south to over 600 mm in the extreme northeast. The country suffers from prolonged and periodic droughts. Xerophytic shrubs, grasses and dwarf trees cover most of the Central Plateau, forests are found in the extreme north.

### Population

Total (1991): 1.5 million  
 Annual growth rate (1981-90)<sup>a</sup>: 3.1%  
 Literacy (1985): 72.0%  
 Life expectancy (1991): 58 years

### Economy (values reported in 1985 PPP dollars)

Gross Domestic Product (1991): 3,945 million dollars  
 Per capita GDP (1991): 2,662 dollars

Agricultural GDP (1991): 310 million dollars  
 Share of agriculture in GDP (1991): 7.9%

Annual growth rates (1981-90)<sup>a</sup>  
 GDP: 1.9%  
 GDP per capita: -1.1%  
 AgGDP: 1.0%

### Trade (values reported in current dollars)

Net surplus total trade (1991): -263 million dollars  
 Net surplus agricultural trade (1991): 135 million dollars  
 Percentage of agricultural imports in total imports: 4.0%  
 Percentage of agricultural exports in total exports: 19.0%  
 Major agricultural import commodities (1991)<sup>b</sup>: poultry meat (32%), pulses (22%), refined sugar (21%), and cotton lint (10%)  
 Major agricultural export commodities (1991)<sup>b</sup>: beef & veal (94%), and mutton & goat (6%)

### Agriculture

Agricultural land (1990): 38.7 million ha  
 Annual growth rate (1981-90)<sup>a</sup>: 0.0%  
 Percentage arable: 1.7%  
 Percentage permanent crop: 0.0%  
 Percentage permanent pastures: 98.3%  
 Percentage irrigated arable land: 0.6%

Economically active agricultural population (1991): 0.2 million  
 Annual growth rate (1981-90)<sup>a</sup>: 0.3%  
 Percentage in total economically active population: 34.3%

Major crops (in decreasing order of value of production)<sup>c</sup>: maize, millet, sorghum, and wheat.

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

<sup>a</sup> Least squares growth rate.

<sup>b</sup> Bracketed percentages represent value share of the respective total.

<sup>c</sup> Crop production accounts for only 10% of the agricultural sector's total output.

## Appendix 2: Definitions and concepts

### NARS

The construction of quantitative and internationally comparable expenditure, personnel, and related measures of a national agricultural research system () 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, 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 socioeconomic 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; and (c) if the position explicitly involved tasks other than agricultural research. In the lat-

ter 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 have been 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

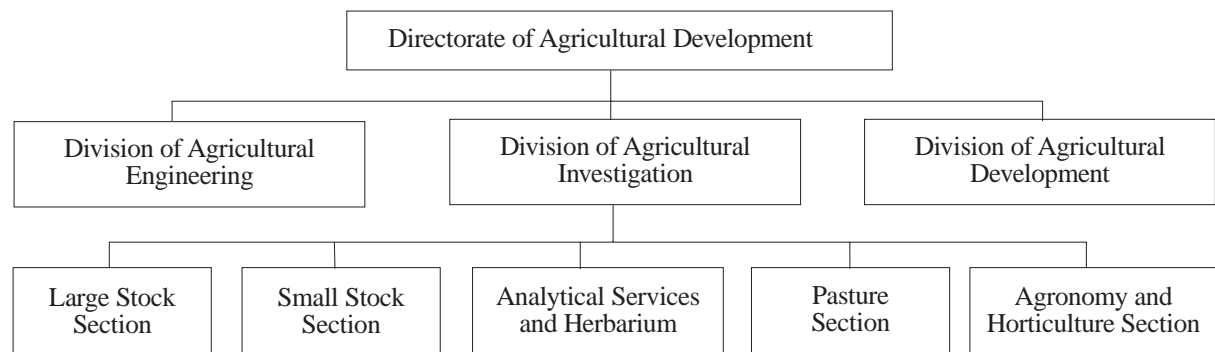
A zero indicates an actual observation of zero, a dash indicates an observation is not relevant (due to institu-

tional 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

*Division of Agricultural Investigation, DAI (c. 1992)*



#### **Appendix 4: Addresses of the agricultural research institutes**

Division of Agricultural Investigation  
Directorate of Agricultural Development  
Ministry of Agriculture, Water and Rural Development  
Private Bag 13184  
Windhoek 9000  
NAMIBIA

Directorate of Forestry  
Ministry of Agriculture, Water and Rural Development  
Private Bag 13184  
Windhoek 9000  
NAMIBIA

Research Division  
Ministry of Wildlife, Conservation and Tourism  
Govt. Offices 5th Floor  
Private Bag 13346  
Windhoek 9000  
NAMIBIA

Research and Stock Assessment Division  
Directorate of Sea Fisheries  
Ministry of Fisheries and Marine Resources  
Private Bag 13184  
Windhoek 9000  
NAMIBIA

**Appendix 5: Researcher and research expenditure totals, 1990-92**

Total Number of Researchers		Units: full-time equivalents									
Category	Name institute	1985	1986	1987	1988	1989	1990	1991	1992		
Public	DAI, MAWRD	2	5.3	8.7	12	13.0	14	19.0	21		
	Dir. of Forestry, MAWRD						1	2	2.0		
	Res. Div., MWCT						14.0	19.0	21		
	RSAD, MFMR				6	15	17.0	19.0	21		
Total							46	59	65		
Sources:		1023			1023	1383	1023; 999	999	1023; 1380;		1079

Note: Italicized figures represent data that are either constructed or interpolated.

Total Research Expenditures (units: millions of current Rands)		1990	1991	1992*
Category	Name institute	1990	1991	1992*
Public	DAI, MAWRD	7.388	9.482	13.366
	Dir. of Forestry, MAWRD	<i>0.244</i>	0.500	<i>1.163</i>
	Res. Div., MWCT	2.952	2.668	3.159
	RSAD, MFMR	4.397	5.034	6.355
Total		14.981	17.684	24.042
Deflator		161.74	178.04	194.13
Constant 1985 LCU		9.262	9.933	12.385
Constant 1985 PPP dollars		10.241	10.982	13.693
Sources:		999; 1381	999; 1381	999; 1381

Note: Italicized figures represent data that are either constructed or interpolated.

## Appendix 6: Research staff development

### Division of Agricultural Investigation (DAI), MAWRD

	1985	1986	1987	1988	1989	1990	1991	1992
Nationals								
PhD						1	1	0
MSc						4	6	10
BSc						7	10	9
Subtotal	2	5.3	8.7	12	12.0	12	17	19
Expatriates	0	0	0	0	1.0	2	2.0	2
Total	2	5.3	8.7	12	13.0	14	19.0	21
Sources:	1023			1023		999/1023	999	1023

Note: Italicized figures represent data that are either constructed or interpolated.

a) Staff breakdown includes expatriates

### Directory of Forestry, MAWRD

	1990	1991	1992
Nationals			
PhD		1	1.0
MSc		0	0
BSc		0	0
Subtotal	0	1	1.0
Expatriates	1	1	1.0
Total	1	2	2.0
Source:	1023	1023	

Note: Italicized figures represent data that are either constructed or interpolated.

### Research Division, MWCT

	1990	1991	1992
Nationals			
PhD			8
MSc			7
BSc			5
Subtotal			20
Expatriates			a)
Total	20.0	20.0	20
Source:			

Note: Italicized figures represent data that are either constructed or interpolated.

a) Staff breakdown includes expatriates.

### Research and Stock Assessment Division (RSAD), MFMR

	1988	1989	1990	1991	1992
Nationals					
PhD					4
MSc					6
BSc					11
Subtotal					21
Expatriates					a)
Total	6	15	17.0	19.0	21
Sources:	1023	1383			1079

Note: Italicized figures represent data that are either constructed or interpolated.

a) Staff breakdown includes expatriates.

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