

# ASTI

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## **STAFF AGING AND TURNOVER IN AFRICAN AGRICULTURAL RESEARCH**

### **A Case Study on Zambia Agricultural Research Institute**

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Analyzing Trends, Challenges, and Opportunities**

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## Acronyms and Abbreviations

NGO(s)	nongovernmental organization(s)
PSTDP	Public Service Training and Development Policy
R&D	research and development
SADC	Southern African Development Community
ZARI	Zambia Agricultural Research Institute

## Abstract

The output of R&D in Africa has been at the core of the poverty and underdevelopment. Underlining this higher objective is the quality of human resources in the R&D, both in terms of numbers and qualifications. The long history of investment in agriculture in Africa has not borne appropriate fruit, so a sharper focus is needed in looking at the status of the human resource capacity at R&D institutions, particularly the effect of staff aging and turnover in agricultural R&D. To this end, a case study was undertaken on the Zambia Agricultural Research Institution (ZARI), Zambia's public agricultural research institution, to elucidate trends in staffing levels, recruitment, training, and retention, and to address issues related to staff aging and turnover. A questionnaire was administered, complemented by focused discussions with current and former researchers.

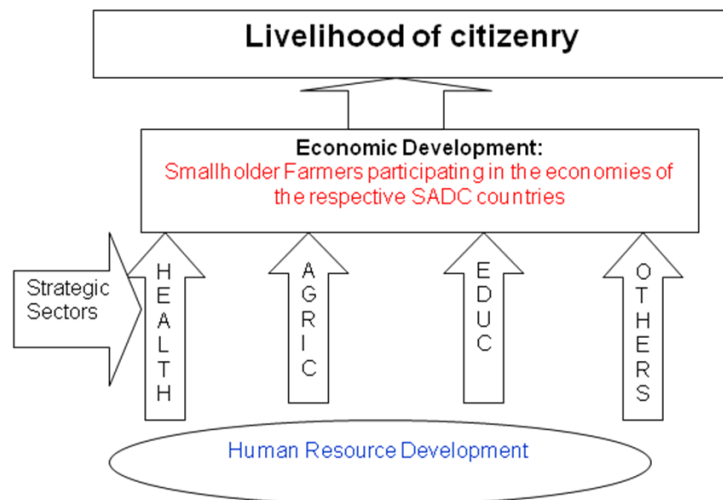
It was evident that ZARI had suffered from low and, at times, negative capacity growth from 2001 until 2006, a period characterized by net researcher departures due to externally dictated conditions. From 2007 there was a surge in the recruitment of researchers, but the period of nonrecruitment had caused severe damage, polarizing the researcher pool in terms age and qualifications, and creating a succession gap. One underling issue has been the inability of the institution to retain researchers, and to train and mentor those who stay, overcoming dissatisfaction at poor service conditions. While ZARI's researchers were evaluated, such evaluations were not connected with tangible rewards, and opportunities for promotion were limited. Other means of motivating researchers are needed that address both social and security-based needs. Provision of personal loans and the facilitation of health are important examples of benefits that act as strong motivating factors. Hence, training and development interventions must serve to enhance not only the knowledge and skills of researchers, but also motivation.

Undoubtedly, low levels of government funding to ZARI have had a significant negative effect on the morale of researchers, and if these issues are to be dealt with, the fundamental issue of funding must urgently be addressed.

## 1. INTRODUCTION

Agricultural growth is essential for improving the welfare of the majority of Africa's poor people. As producers, 70 percent of all Africans and nearly 90 percent of those in poverty primarily work in agriculture (World Bank 2000). Moreover, roughly 80 percent of the continent's poor people live in rural areas, and even those who do not depend heavily on increasing agricultural productivity and value chains to lift them out of poverty. Given agriculture's important contribution to economic development, and the key role of human resource development along the whole chain (Conway 1997; World Bank 2000), the quality of human resources is a strategic factor in addressing poverty and livelihood security through agriculture (Figure 1).

Figure 1. The strategic importance of human resource capacity in agricultural development



Sources: Conway (1997) and World Bank (2000).

Recent studies in Sub-Saharan Africa have revealed that when it comes to human resource capacity, it's not simply a case of quantity, but one of quality (Beintema et al. 2004; Flaherty and Mwala 2010). Yet the combined effect of low recruitment levels and staff attrition stemming from the structural adjustment programs of the 1990s caused human resource capacity in public agricultural research and development (R&D) in Zambia to significantly decline in terms of absolute numbers, qualification levels, and experience (Sahn, Dorosh, and Unger 1997). The loss of senior (MSc- and PhD-qualified) researchers due to resignation, retirement, and death left the country with a small pool of mostly junior (BSc-qualified) agricultural researchers (Flaherty and Mwala 2010). Overall, these changes have produced a low-performing national R&D system, compromising the rate of development and delivery of innovations.

While the effects of structural adjustment are significant, another dimension—the failure of public institutions to retain recruited researchers—must also be addressed. In most African countries, salary and retirement packages and conditions of service are poor. In addition, many agencies have outdated infrastructure and insufficient operating budgets to conduct research. Even with an increase in training opportunities in a number of countries, research agencies have difficulty keeping researchers once they attain higher degrees and can attract offers of better remuneration and conditions either in the higher education or private sectors or abroad (FARA 2006; World Bank 2007). A major concern in many countries, particularly in West and Central Africa, is a rapidly aging pool of scientists, many of whom will approach retirement age within the next decade (Beintema and Stads 2011). Attracting and retaining researchers is an even more seriously problem in countries with small research capacities that

lack of a critical mass of well-qualified researchers, which highlights the need for regional initiatives focusing on the needs and vulnerabilities of such countries (Beintema and Stads 2011). The Zambia Agricultural Research Institute (ZARI) reported that the loss of its researchers was exacerbated by inadequate compensation and benefits, low morale, slow recruitment processes, and an undefined path of career development (ZARI 2009). The effect of staff aging and turnover, therefore, demands critical attention.

#### Box 1. Methodology

This case study is based on data and information collected through a literature review, a survey, and interviews guided by a number of research questions. A total of 40 ZARI researchers were surveyed, and one-on-one discussions were undertaken with a further 15 randomly chosen researchers who had either resigned or retired from ZARI. Finally, additional detailed information was collected through a questionnaire of ZARI's administration personnel.

## 2. HUMAN RESOURCE CAPACITY AT THE ZAMBIA AGRICULTURAL RESEARCH INSTITUTE

In examining human resource capacity in agricultural R&D at ZARI, this study focused on researchers and technicians. The qualifications of technicians vary from certificates to diplomas (Table 1). Functionally, technicians at ZARI assist in the execution of research, but they do not conduct research themselves. Data indicate very little shift in the number and qualification levels of technicians employed at ZARI from 2001 until 2010, although a spike in numbers was evident between 2007 and 2008. The resulting ratio of technicians to researchers averaged 1 to 1.5, which is in line with the levels reported in other studies. Hence no attrition problem was evident among technicians employed at ZARI during the study's review period.

**Table 1. Number of support staff employed at the Zambia Agricultural Research Institute by highest qualification and gender, 2001–10**

Level	Gender	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
MSc	Female	–	–	–	–	–	–	–	–	–	–
	Male	–	–	–	–	–	–	–	–	–	–
BSc	Female	–	–	–	–	–	–	–	–	–	–
	Male	–	–	–	–	–	–	–	–	–	–
Less than BSc	Female	16	16	17	17	18	25	28	32	32	33
	Male	49	49	48	48	53	59	67	77	80	85
<b>Total</b>		<b>65</b>	<b>65</b>	<b>65</b>	<b>65</b>	<b>71</b>	<b>84</b>	<b>95</b>	<b>109</b>	<b>112</b>	<b>118</b>

Source: Compiled by authors.

Note: The support staff category predominantly comprises technicians.

Newly recruited researchers begin their careers at ZARI at any position depending on the experience and qualification, besides the position being vacant. The lowest entry level is that of agricultural research officers. The minimum educational qualification for this level is a BSc degree in agriculture or a related field. Advancement to the levels of senior, principal, and chief agricultural research officers can only occur through promotion based on performance evaluations that are conducted annually but not all assessments result in promotion. Over the 10-year period under review, researcher numbers contracted slowly, from 117 individuals in 2001, to 102 researchers in 2006 (Table 2), largely due to a civil service recruitment freeze (Flaherty and Mwala 2010). As with technicians, researcher numbers surged in 2007 when the freeze was lifted. The proportion of PhD-qualified researchers over the period was small but stable, whereas shares for those qualified to the MSc- and BSc-degree levels fell, implying that researcher attrition was higher among less-qualified researchers,

especially from 2002 to 2005. After 2007, the vast majority of newly recruited researchers were qualified to the BSc level only; levels of researchers with MSc and PhD qualifications remained stable. The institute has a strong hierarchical structure, comprising numerous junior staff but very few senior positions; hence, the vast majority of vacancies are for junior staff. As of 2010, the number of researchers employed by ZARI was about 171; of those, 5 percent held PhD degrees, and 26 percent held MSc degrees. Such low levels of more highly qualified researchers are understandably worrisome. The ratio of female to male researchers was 1 to 3 in 2010, up from a low ratio of 1 to 5 in 2001. This improvement, however, is the result of the recruitment of junior (BSc-qualified) researchers; as of 2010, the ratio of women to men among PhD-qualified researchers was only 1 to 10.

**Table 2. Number of researchers employed at the Zambia Agricultural Research Institute by highest qualification and gender, 2001–10**

Qualification level	Gender	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
PhD	Female	1	1	1	1	1	1	1	1	1	1
	Male	5	6	6	5	5	5	7	8	8	8
	Female share (%)	20.0	16.7	16.7	20.0	20.0	20.0	14.3	12.5	12.5	12.5
MSc	Female	9	8	8	9	10	11	11	11	11	11
	Male	35	40	42	34	30	32	34	33	40	33
	Female share (%)	25.7	20.0	19.0	26.5	33.3	34.4	32.4	33.3	27.5	33.3
BSc	Female	12	12	12	12	15	15	19	29	25	31
	Male	55	53	49	42	44	38	56	78	89	87
	Female share (%)	21.8	22.6	24.5	28.6	34.1	39.5	33.9	37.2	28.1	35.6
<b>Total</b>		<b>117</b>	<b>120</b>	<b>118</b>	<b>103</b>	<b>105</b>	<b>102</b>	<b>128</b>	<b>160</b>	<b>174</b>	<b>171</b>
<b>Overall female share (%)</b>		<b>22.5</b>	<b>19.8</b>	<b>20.1</b>	<b>25.0</b>	<b>29.1</b>	<b>31.3</b>	<b>26.9</b>	<b>27.7</b>	<b>22.7</b>	<b>27.2</b>

Source: Compiled by authors.

### 3. DEVELOPING COMPETENCIES AMONG RESEARCHERS

Guidelines for developing competencies among civil service staff in Zambia are spelled out in the country's Public Service Training and Development Policy (Republic of Zambia 2005). Structural adjustment programs had similar effects on staffing levels in public R&D institutions across the Sub-Saharan Africa. Any recruitment that did occur at ZARI was mostly from external sources, although a small number of researchers transferred within ministries, for example, moving from extension to research (Table 3).

**Table 3. Recruitments and departures of researchers at the Zambia Agricultural Research Institute, 2001–10**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Recruitments	6	10	2	–	9	4	31	26	18	3
Retirements	2	2	3	1	3	4	3	2	3	4
Resignations	4	2	1	3	2	2	2	1	–	1
Deaths	1	3	–	1	2	1	0	1	1	1
Total attrition	7	7	4	5	7	7	5	4	4	6
<b>Net change</b>	<b>–1</b>	<b>3</b>	<b>–2</b>	<b>–5</b>	<b>2</b>	<b>–3</b>	<b>26</b>	<b>22</b>	<b>14</b>	<b>–3</b>

Source: Compiled by authors.

Survey data indicate that only 23 percent of the interviewed researchers received any form of training during 2001–10 (Table 4). Those that did receive training were mostly either agricultural research officers (44 percent) or chief agricultural research officers (33 percent). The high proportion of training among the junior researchers stemmed from a stipulation to impart necessary research skills to new recruits, whereas the prevalence of training among the senior researchers occurred cumulatively over time, as evidenced by the fact that most of the recipients were over 50 years old (Table 5). Approximately two-thirds of those who were trained (mostly the junior researchers) reported receiving some kind of short-term training, while the remaining one-third (the more senior researchers), received MSc- and PhD-level training.

**Table 4. Researcher training provided by Zambia Agricultural Research Institute by seniority level in 2011**

Level of seniority	Unit	Received training	Did not receive training
1. Chief agricultural research office	Number	3	–
	Share within position (%)	100	–
	Share of those trained (%)	33	–
2. Principal agricultural research officer	Number	–	5
	Share within position (%)	–	100
	Share of those trained (%)	–	17
3. Senior agricultural research officer	Number	2	6
	Share within position (%)	25	75
	Share of those trained (%)	22	20
4. Agricultural research officer	Number	4	19
	Share within position (%)	17	83
	Share of those trained (%)	44	63
<b>Total</b>	<b>Number</b>	<b>9</b>	<b>30</b>
	Share within position (%)	23	77

Source: Compiled by authors.

Note: Results are based on a sample of 40 researchers.

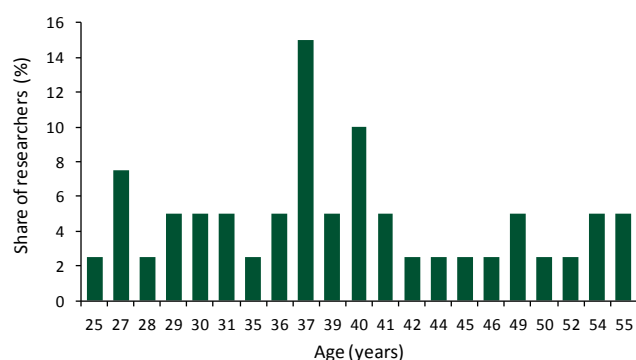
Although the provision of a clear career path is advocated in training policy documentation, lack of funding has prevented ZARI from being able to adhere to this recommendation. The structure of the organization presents a further challenge because, given its strong hierarchy, senior positions are few compared with the junior ones. Advancement therefore depends on the availability of vacancies, which significantly restricts career opportunities at the Institute (Kaliangile et al. 1989). In terms of age composition, as of early 2011 the majority of researchers were younger than 41 years old (65 percent), and of the surveyed researchers 30 percent were between 37 and 40 years old (Table 5; Figure 2). Most of these, however, held the most junior positions (52 percent). At the highest level of seniority, researchers were over 50 years old, which is highly undesirable given the retirement age of 55 years.

**Table 5. Age of researchers at Mt Makulu station by qualification level, 2011**

Level of seniority	Unit	Age group								Total
		<30		30–39		40–49		>50		
		Within age	Within position	Within age	Within position	Within age	Within position	Within age	Within position	
1. Chief agricultural research office	Number	–	–	–	–	–	–	4	–	4
	Share (%)	–	–	–	–	–	–	67	100	10
2. Principal agricultural research officer	Number	–	–	–	–	3	–	2	–	5
	Share (%)	–	–	–	–	25	60	33	40	25
3. Senior agricultural research officer	Number	–	–	3	–	5	–	–	–	8
	Share (%)	–	–	42	37	42	63	–	–	20
4. Agricultural research officer	Number	7	–	12	–	4	–	–	–	23
	Share (%)	100	30	58	52	33	17	–	–	58

Source: Compiled by authors.

Note: Results are based on a sample of 40 researchers.

**Figure 2. Distribution of surveyed researchers by age, 2010**

Source: Compiled by authors.

The majority of ZARI's researchers were below 40 years of age as of early 2011 (56 percent) and of those, most held only BSc-level qualifications (60 percent). Researchers qualified to the PhD level constituted only 5 percent of all researchers that year; all were over 40 years old, and 77 percent were over 45 years old (Table 6). The comparatively high number of older researchers with only BSc degrees could reflect the lack of training opportunities during the time of the recruitment freeze. Most donor-supported training opportunities have age limits, curtailing opportunities for these researchers.

**Table 6. Age of researchers at the Zambia Agricultural Research Institute by qualification level, 2010**

	20–24	25–29	30–34	35–39	40–44	45–49	>49	Total
BSc	–	30	51	21	5	10	1	118
MSc	–	2	2	7	6	17	10	44
PhD	–	–	–	–	2	3	4	9
Total	–	32	53	28	13	30	15	171
Share (%)	–	19	31	16	8	18	9	

Source: Compiled by authors.

The picture that emerges is one of a research system dominated by young researchers qualified to the BSc level only. Most threatening to the system is that the experienced researchers are advancing



in age, and some are due to retire in the next two to three years. This calls for emergency interventions in terms of aggressive training and strategic recruitment initiatives.

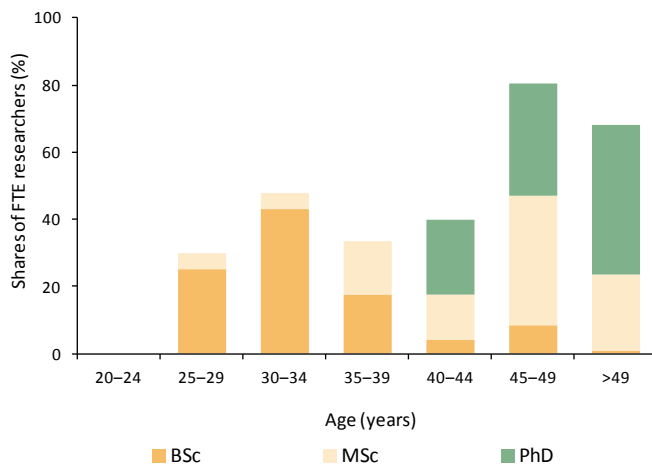
### Implementing the Training Policy

Training policy in Zambia’s civil service is implemented through the aforementioned Public Service Training and Development Policy, which articulates institutional arrangements for the successful and efficient implementation of training. The Public Service Management Division of the Cabinet Office oversees policy review, coordination, monitoring, and evaluation of public service training and development activities, ultimately ensuring adherence to policy guidelines. A Human Resource Development Technical Committee provides further supervision and direction on implementation. Technical issues are dealt with through the Management Division’s Department of Human Resources Development, which links the line Ministry (the Ministry of Agriculture and Cooperatives) and the respective institution (in this case, ZARI). This implementation framework also directs the resource mobilization and financing of training, stipulating that it is to be funded through budgetary allocations, supplemented by contributions from cooperating partners. A key constraint to training efforts in recent years has been both low and erratic levels of funding, a situation prevalent in many developing countries due to the fiscal challenges many governments are facing.

### The Effect of the Recruitment Freeze

ZARI employs three distinct categories of researchers, represented by three distinct age distributions (Figure 3). The most junior researchers, those qualified to the BSc level, have a near normal age distribution; the group qualified to the MSc-degree level presents a “bimodal” age distribution, in that it is slightly skewed; and the group qualified to the doctorate level has a severely skewed distribution across age. In addition, the distributions do not overlap sufficiently to be supportive of each other, which is likely due—at least in part—to the recruitment freeze. A secondary possible indicator of the effect of the recruitment freeze is the lag in the peaks between BSc- and MSc-qualified researchers under 40 years old. Ideally these peaks should occur within similar period, as is the case with the distributions of MSc- and PhD-qualified researchers. Unsynchronized peaks, which imply a lack of complementary contributions by researchers, could be a sign that effective R&D impact is compromised (Tables 5 through 7).

**Figure 3. Age distribution of researchers employed at the Zambia Agricultural Research Institute by highest qualification, 2010**



Source: Devised by authors.

#### **4. INCREASING THE CAREER MOBILITY OF RESEARCHERS**

With increased training, and hence specialization, comes increased limits on mobility across disciplines, such that the only path for advancement is seniority, which usually comes with management responsibilities that take time away from research. The results from the survey failed to capture evidence of any geographical or interdisciplinary mobility, which in part is due to the saturation of job opportunities (common in the early to mid-1990s when researchers moved into a wide variety of positions within agriculture), and in part stems from a lack of trained researchers with the necessary skills to be able to move, given that so many are young and inexperienced.

##### **Recommendations**

1. While not under ZARI's jurisdiction, recruitment must adhere to civil service guidelines and take into consideration the critical analysis provided in publications such as those produced by the International Food Policy Research Institute's (IFPRI) Agricultural Science and Technology Indicators (ASTI) initiative. A position paper on strategies for rationalizing human resource capacity could be prepared for consideration by stakeholders based on evidence relevant to the Southern African Development Community (SADC).
2. Training of the young researchers at the agricultural research officer level needs to be accelerated and undertaken locally to ensure that researchers come to appreciate their environment and related research challenges. While specialization is key in research, knowledge of participatory research methods would ensure that the research undertaken is relevant and interdisciplinary.
3. The training and development process provided by the public service guidelines must be adhered to in all training interventions to ensure relevance to the individual, as well as to their occupation and the organization that employs them. This approach will ensure a clear career path for the researchers, which will also serve as a motivation.

#### **5. MOTIVATING RESEARCHERS**

Opportunities for training, as discussed in the previous section, offer one of the strongest potentials for motivating researchers. Survey results indicated that, beyond anything else, researchers want a clear path for promotion. On the other hand, researchers surveyed clearly indicated areas where changes in the conditions of service could increase the motivation levels of researchers employed at ZARI (Table 8). High on the list of important factors was the facilitation or provision of personal loans (35 percent), followed by the provision of training (24 percent). Low on the list were assistance with transport and improvements in research equipment (1 and 3 percent, respectively). It is evident that the key issues relate to physiological and security needs, per Maslow's hierarchy of individual needs. None of the most-valued factors related to social or ego enhancement; surprisingly, however, salary levels were not cited as a major motivating factor.

**Table 7. Areas evoking dissatisfaction among surveyed researchers, 2011**

Motivating factors	Cited (number of times)	Share of total (%)
Facilitation or provision of personal loans	22	35
Provision of training	15	24
Provision of accommodation	6	10
Opportunities for promotion	6	10
Improved salary levels	5	8
Provision of insurance	4	6
Improved research equipment	2	3
Provision of allowances	2	3
Provision of transport	1	2
Total	63	100

Source: Compiled by authors.

Note: The sample included 40 researchers; shares sum to more than 100 percent due to rounding.

Efforts are made to involve researchers in as many institutional activities as possible so to promote an inclusive environment, but financial incentives (such as insurance and loans) are difficult to provide due to budgetary constraints. That said, the research itself has the potential to either motivate or frustrate researchers in terms providing a professional challenge, and satisfactory mentorship plays into this (as, once again, does training). In terms of performance-based recognition and rewards, all surveyed researchers indicated that they underwent evaluations, but only 17 of the total of 40 were promoted as a result.

### Recommendations

1. Adequately motivating researchers to remain in their positions is not easy, regardless of conditions of service, but it is vital in a competitive job market. Success depends on satisfying a combination of physiological and security needs; salary levels alone are insufficient. Benefits such as health insurance and assistance with loans play a significant role in improving the overall lifestyle of researchers and their families, at the same time relieving stress and deterring researchers from seeking “greener pastures.”
2. Providing a conducive working environment, where output is recognized and rewarded, is an important factor in retaining researchers, but the government cannot accomplish this alone. ZARI should forge partnerships with a view to leveraging additional, much-needed resources.

## 6. MINIMIZING THE LOSS OF RESEARCHERS

High staff attrition rates constitute the most undesirable situation for any organization but are largely unavoidable in strongly hierarchical institutions where the proportion of junior to senior positions is considerable, and vacancies in senior roles often only occur as a result of retirement. In this situation, organizations can only aim to minimize the effects of attrition rather than prevent it. With the increasing demand for high-quality research output during 2001–06, ZARI’s loss of researchers had a considerably negative effect. From 2007 onward, however, recruitment levels more than counteracted attrition in terms of numbers, but qualification levels deteriorated. Surveyed researchers, who had either retired or resigned, indicated that their reason for departing the Institute involved dissatisfaction with conditions of employment, including both monetary and nonmonetary benefits (Table 8).

**Table 8. Reasons provided by surveyed researchers for leaving the Zambian Agricultural Research Institute, 2011**

	Reason for leaving			
	Salary	Frustration	Unclear career path	Poor working conditions (other than salary)
Cited (number of times)	7	2	4	17
Share (%)	23	7	13	57

Source: Compiled by authors.

Note: The sample included 40 researchers.

## Recommendations

1. ZARI must introduce innovative ways of motivating its researchers to remain in employment with the Institute. Facilitating health insurance and offering personal loans are good examples of benefits that would discourage researchers from seeking alternative employment.
2. Ultimately, the Institute needs a clearly defined strategic plan for developing its human resource capacity. Such a plan would outline such things as the timing recruitment initiatives to the loss of senior researchers due to retirement, and a clear career path to improve morale and encourage researchers to remain at ZARI.

## 7. CONCLUSIONS

Staffing levels at ZARI stagnated between 2001 and 2007 as a result of a civil service recruitment freeze, which in turn created inexperienced a lack of middle-level researchers in terms of age, qualifications, and experience. This gap needs to be closed through careful evidence-based planning using information and data from studies such as those produced by the ASTI initiative over the past two decades.

With the recruitment of mainly junior researchers since the cessation of the recruitment freeze, ZARI's researcher pool is disproportionately young and inexperienced. This situation calls for urgent interventions in terms of training and strategic recruitment in adherence with policy guidelines. Furthermore, an institute-wide human resource plan is needed, proactively taking into account emerging research issues like climate change and biofuels. Ongoing efforts must be made to train, mentor, and retain researchers if the institution is to effect the desired impact through agricultural R&D. As of early 2011, there was little evidence of efforts to motivate or provide incentives for researchers to remain with ZARI other than for limited training opportunities—based on funding levels—and limited promotional opportunities—given the high ratio of junior to senior level position. Providing a stronger career path for researchers would go a long way toward improving retention rates, as would enhancing the fulfillment of researchers' psychological (morale-related) and security-based needs. Lack of funding has undoubtedly had a significantly negative effect on the Institute's ability to offer appropriate staff incentives, such as training, salary increases, and loans and insurance, so successfully addressing the dual problems of an inexperienced pool of researchers and high attrition rates goes hand-in-hand with overcoming the fundamental challenge of low and erratic funding levels.

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The Agricultural Science and Technology Indicators (ASTI) initiative compiles, analyzes, and publishes data on levels and trends in agricultural R&D investments, capacities, and institutional arrangements in developing countries. ASTI is managed by the International Food Policy Research Institute (IFPRI) and involves collaborative alliances with many national and regional R&D agencies.

Jointly convened by ASTI/IFPRI and the Forum for Agricultural Research in Africa (FARA), the conference, "Agricultural R&D -- Investing in Africa's Future: Analyzing Trends, Challenges, and Opportunities," brought together experts and stakeholders from the region to contribute their expertise for the purpose of distilling new insights and creating synergies to expand the current knowledge base. The themes under focus were (1) Why African governments under invest in agricultural R&D; (2) How human resource capacity in agricultural R&D can be developed and sustained; (3) How institutional structures can be aligned and rationalized to support agricultural R&D; and (4) How the effectiveness of agricultural R&D systems can be measured and improved.

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This background paper has not been peer reviewed. Any opinions stated herein are those of the author(s) and are not necessarily endorsed by or representative of IFPRI or FARA.

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