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### ICT/ICM human resource capacities in agricultural research for development in Eastern and Central Africa

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**Abstract.** Agricultural research in sub-Saharan Africa faces great challenges in promoting agricultural development. Information technologies for agricultural research for development are evolving quickly, not only in the developed world but also in developing countries. The Regional Agricultural Information Network (RAIN) of the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) conducted an institutional assessment of policies, and the status of human resources with respect to their availability, competence levels, and training needs in almost all member countries of ASARECA. The following description is a summary of an assessment report which is available, including extensive data, on hardcopy (partially), CD-ROM, and [www.asareca.org/rain](http://www.asareca.org/rain).

**Background.** Agricultural research in sub-Saharan Africa (SSA) faces great challenges in promoting agricultural development. In SSA, agriculture determines economic growth, food security, and poverty alleviation. Agriculture accounts for 35 % of the SSA's gross domestic product, 65 % of exports, and 70 % of employment (Townsend, R.F. 1999. Agricultural incentives in sub-Saharan Africa. Policy Challenges. World Bank Technical Paper No. 444).

Agriculture is central to the livelihood of the rural poor. At the same time, documentation and dissemination of technology are weak. Modern information and communication technology (ICT) and appropriate information and communication management (ICM) are necessary to assist in agricultural research for development (R4D). ICT are evolving quickly, and the so-called "digital divide" is closing rapidly, also in Africa. However, adoption of ICT is uneven among and within countries. Many small and large initiatives are in progress on ICT and ICM related to agricultural R4D, including institutions like the Global Forum on Agricultural Research (GFAR) and the Forum for Agricultural Research in Africa (FARA).

ASARECA is one of three sub-regional organizations comprising FARA. It includes ten countries: Burundi, D.R. Congo, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Sudan, Tanzania, and Uganda. One of ASARECA's strategies is to enhance the capacity for accessing and managing agricultural information. RAIN is one of 17 regional networks, programs and projects of ASARECA. RAIN's emphasis is on the strengthening of regional capacities to access, generate, exchange, package, disseminate and utilize this information to further economic growth and social welfare.

From a recent priority-setting exercise and follow-up consultations, RAIN concluded that "Insufficient skills in information technology and insufficient exposure to skills required for good information management" is the most urgent problem-solving area that RAIN should focus on. RAIN proposed to undertake a region-wide "Assessment of ICT/ICM human resource capacities and related training needs in the context of agricultural R4D in Eastern and Central Africa", and to determine the way forward to addressing this challenge. Funded through a grant provided by the Technical Centre for Agricultural and Rural Cooperation (CTA), and with the help of three consultants (authors 1 to 3), RAIN conducted an institutional assessment of policies (human resources, ICT/ICM), status of human resources (number, cadres, gender, level of employment, staff turnover), competence levels (qualifications), human resource and training needs. We studied the profile of existing training institutions, and specified recommendations and action plans on training programs and activities, delivery mechanisms, and the selection of beneficiaries.

**Assessment methodology.** An inception meeting in June 2004 involving the three consultants and RAIN staff initiated the assessment. Over the following seven months, through visits, interviews, questionnaire surveys, and desk studies, we examined institutional ICT/ICM policies, human resources, and training needs.

The target institutions were selected to ensure that all major stakeholders of RAIN were involved in the study: national agricultural research institutes; training institutions, for example, universities with agricultural research activities; government departments related to agriculture; policy and regulatory organizations, for example, councils of science and technology; ICT/ICM service providers; rural service providers, for example, NGOs and farmer associations; regional networks and initiatives, such as ASARECA's networks, programs and projects; and international agricultural research centers. We involved the international centers because of their close collaboration with NARIs, but we did not include them in the analyses.

We collected data for assessing institutional ICT/ICM capacities and for identifying skills gaps on the following aspects: strategic policy environment, information management, technology management, communication management, and service provision and partnerships. We used interviews as a fact-finding technique. We visited institutions to establish the situation on the ground, and to get first-hand information on constraints, opportunities, and training needs in ICT/ICM. We used a questionnaire (which RAIN also translated into French) to collect data from a wide spectrum of respondents. We pre-tested the questionnaire in Kenya and Uganda to ensure that the questions were well formulated. We conducted desk studies to review reports of previous studies, institutional documents, and websites.

Data from the questionnaires were both qualitative and quantitative. We used SPSS in handling the data. We analyzed most variables, per country, to see the specific country situation, and across countries, to get a regional view. We categorized institutions to find differences as influenced by type and core activity of the institutions. We also used the results from the questionnaires to verify our interview findings summarized in narrative form.

During the inception meeting, we agreed that the findings of the study be presented in four reports, each indicating major accomplishments: inception, country, interim, and final reports. After the inception meeting, we produced an inception report. We prepared country mission reports after our country visits. We presented and discussed an interim report during a consolidation meeting in preparation of the final report. RAIN coordinated the translation of the final report into French, and its distribution to stakeholders.

**Findings.** We collected data from all ASARECA countries except Eritrea. We interviewed about 250 people from Kenya (84), Tanzania (45), Uganda (43), Madagascar (24), Burundi (21), Rwanda (18), and Ethiopia (12). Fifty-nine of the interviewees were women, 22 of who held high positions and 17 held ICT/ICM-related posts.

We received questionnaires from 66 respondents. Three were from international institutions and 63 from national institutions in ASARECA countries. Because of late arrival, we could not analyze five questionnaires from national institutions. To avoid distortion, we did not include the well-equipped international institutions in the analysis.

The establishment and implementation of well thought-out policies is an indicator of foresight and enlightenment of managers. In our study, we hypothesized that the development and pursuit of ICT/ICM-supportive policies are an indication of the commitment of managers to promoting the development and use of ICT/ICM. In the present study, 32 out of 58 questionnaire respondents indicated that their institutions did not have a written ICT/ICM policy. Even though many of the target institutions lacked written policies, the levels of ICT/ICM activities were quite high. For example, most NGOs and farmer organizations, which did not have written policies, had well-developed ICT/ICM infrastructure and were using advanced forms of ICT/ICM technologies in their daily work.

However, most respondents stated that their human resource policies, whether present or still in preparation, did not have any clauses that specifically addressed the welfare of ICT/ICM professionals. Respondents gave many suggestions on issues that should be addressed in the formulation of both ICT/ICM and human resource policies, including salaries that are competitive with those in the private sector, and frequent training for skills improvement and career advancement for ICT/ICM staff.

Unavailability of resources is one of the key factors affecting institutionalization of ICT/ICM strategies. The most consistent finding was that a good proportion of institutions have no funding at all from any source to support ICT/ICM activities. Partnerships are important in expanding the capacity of institutions to provide services through sharing of resources. The findings of this study reveal that all institutions examined had established partnerships with local and international organizations for various purposes.

Even when relevant policies are in place and resources are not limiting, the attitude and behavior of managers remain critical in the implementation of ICT/ICM strategies. Although the results show that the level of management commitment ranges from none to excellent, the majority of responses show that commitment is mostly inadequate or just adequate.

For example, availability of specialized ICT/ICM units and the quality of their management are a reflection of both the key functions of the institution and the level of commitment of decision-makers to the promotion of ICT/ICM. The library, which is one of the oldest forms of information service, was the most widely available service among the institutions. Nevertheless, we confirmed that most of those libraries are still using traditional methods of information management, and are inadequate in service provision. We established that three ICT/ICM occupational groups are the most seriously affected with respect to shortage of personnel: (1) the group comprising of computer systems analysts, database administrators and computer scientists; (2) computer support specialists, and (3) librarians, curators and archivists.

Scientific and technical information is a pre-requisite for effective research. A limited number of staff had skills to search the Internet and access online journals and e-conferences. Skills for management of content, data and information ranged mainly from non-existent to adequate, with only isolated instances where individuals had excellent skills. Most lacking are skills in preparing digital content, webpage development, developing electronic content, graphic design/desk-top publishing, scientific editing, database management, research data management, and GIS. Skills for dissemination and communication of information were inadequate for almost all types of means, especially print and electronic media, instruction, teaching, and CD-ROM. Only a few respondents indicated excellent skills for the use of certain media.

The capacity of staff to troubleshoot or diagnose problems and maintain ICTs is an asset to any organization, because outsourcing for services can be minimized. Skills are mostly inadequate or not available. Organizations depend on external service providers.

A principal objective of the study was the identification of training needed and training resources that are available. We grouped staff categories into senior managers, information managers, technology managers, academicians and researchers, and technical and administrative support. In each category, we looked at three levels of proficiency: graduate and post-graduate levels, diploma level, and short-term and certificate levels.

On all three levels, "database development and management" figures high up on training needed. Also, training is needed on "GIS" and "information science" at the graduate/postgraduate and diploma levels. The short-term and certificate levels show a long list of training needs. Prominent among the needed skills are Internet technology, web publishing, database and research data management, and even basic computer skills. Academicians and researchers, especially, seem to have a high demand for short-term training on these skills.

During our field visits, we noticed that most of the training needs can be satisfied with resources available locally, in-house, in the country, or in the ASARECA sub-region. In total, 38 out of 58 questionnaire respondents indicated institutions that can offer some form of training. Experience from field visits shows that additional institutions are willing to offer training resources when approached directly. The offer for *training* ranges from a few basic training areas, to a wide variety of partially sophisticated ICT subjects. Training *facilities* offered include class and conference rooms, catering and housing, transport, and ICT equipment. Some institutions may offer classrooms only, others are fully equipped with the latest ICT sophistication.

During our field visits, we found high expectations among the institutions of how RAIN could intervene with regard to constraints and solutions. At institutional level, the important expectations are awareness-building, training, technical assistance, and information exchange. In addition to these expectations, at national level, policy harmonization becomes important. At regional level, networking joins the list of expectations.

**Conclusions and recommendations.** The conclusions from our findings lead to ten recommendations in the following areas: continuous follow-up by RAIN on ICT/ ICM developments, awareness-building on the relevance of ICT/ICM in agricultural research for development, ICT/ICM partnership among individuals and institutions, creation and use of regional ICT/ICM databases, maintenance of a database on development partners, exploration of open and distance learning for training on ICT/ICM, enhancement of Internet connectivity, specification of training needs, identification of training resources, and follow-up and feedback by RAIN on expectations. We suggest specific action plans and give profiles of resource institutions for training within and outside the ASARECA subregion.