

Capacity Development in Ghana's Plant Genetic Resources Centre

An Evaluation

Samuel Bennett-Lartey, Raymond Vodouhe, and Jamie Watts



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Foreword

If research and development organizations are to make a significant contribution to the alleviation of poverty and hunger, they need to strengthen their capacity to perform effectively and efficiently in a rapidly changing environment. In the future, these organizations will face a continuous need to renew themselves and develop new capacities in order to keep up with the accelerating pace of technological, economic and institutional change. Organizations that do not develop the capacity for renewal and growth are unlikely to survive in the increasingly global markets for information and technology.

Although capacity development is crucial for reducing poverty, strengthening the economy and protecting the environment, we know little about how to plan and implement capacity development efforts, or how to evaluate them. Evaluation is an especially important tool for learning how to improve capacity development efforts in the future.

In 1995, ISNAR launched a series of studies on the evaluation of capacity development, in order to develop and test evaluation methods and to learn from past experiences. Initially, our evaluation work focused on ISNAR's own activities. But in 2000, a more ambitious project was undertaken. "Evaluating Capacity Development in Research and Development Organizations" (the ECD project) is based on the following studies of capacity development carried out by national and international partners in Africa, Asia and Latin America:

- *Strengthening rural NGOs in Bangladesh*. Prepared by the Rangpur Dinajpur Rural Service and the International Institute of Rural Reconstruction.
- *Strategic management of agricultural research in Cuba*. Prepared by Cuba's Ministry of Agriculture and the ISNAR New Paradigm Project.
- *Conservation and use of plant genetic resources in Ghana*. Prepared by Ghana's Plant Genetic Resources Centre, the Genetic Resources Network for West and Central Africa and the International Plant Genetic Resources Institute.
- *Integrated management of natural resources in Nicaragua*. Prepared by the National Agrarian University Faculty of Natural Resources.
- *Participatory agricultural research in the Philippines*. Prepared by the Northern Philippine Root Crop Research and Training Center and the User's Perspective with Agricultural Research and Development network.
- *Community-based natural resource management in Vietnam*. Prepared by the Mekong Delta Farming Systems R&D Institute and the International Development Research Centre.

The objective of the global ECD Project is to improve the use of evaluation in capacity development efforts. The project aims to strengthen participants' capability to evaluate, to prepare a set of evaluation case studies and to draw conclusions that will help to improve similar efforts in the future.

As no established methodology for evaluating organizational capacity development currently exists, the ECD Project adopted an action research approach and did not impose a rigid structure on the individual evaluation studies. Instead, each team defined their own evaluation questions and methods. The teams also addressed five "guiding questions":

- What are the key capacities that need to be developed in research and development organizations?
- By what process(es) does organizational capacity development take place?
- How can external agents/agencies contribute to organizational capacity development?
- How should organizational capacity development efforts be evaluated?
- How can evaluation contribute to capacity development efforts?

The work was generously supported by the Australian Centre for International Agricultural Research (ACIAR), the Technical Centre for Agricultural and Rural Cooperation (CTA), the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), the International Development Research Centre (IDRC), the Swiss Agency for Development and Cooperation (SDC) and the core budget of ISNAR.

It is with great pleasure that we present the results of this study on capacity development in Ghana's Plant Genetic Resources Centre. We hope the study, which examines capacity development over more than two decades, will be of interest—not only to the center's stakeholders in Ghana but also to those concerned with improving the management of genetic resources or who seek a better understanding of capacity development processes.

Douglas Horton
Leader ECD Project
ISNAR

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The authors would like to thank the organizations we belong to for supporting the case study. Within Ghana, the Council for Scientific and Industrial Research, the Ministry of Environment, Science and Technology and the staff and stakeholders of PGRC who participated in the workshops, were instrumental to the success of the study. We would like to recognize the GRENEWECA steering-committee members for supporting the study in principle and for contributing their ideas during the network's self-assessment workshop. Within IPGRI, a number of different groups participated in and supported the work. Most notably: the sub-Saharan Africa Regional Office and its Director Kwesi Atta-Krah, the Documentation, Information and Training Group and its Director Elizabeth Goldberg, Lyndsey Withers, the Assistant Director General and Jan Engels, the Director of the Genetic Resources Science and Technology Group. We also wish to thank the staff of IPGRI who agreed to submit to interviews and who took the time to complete surveys about capacity development activities at the institute.

We would like to thank ISNAR, and Doug Horton in particular, for inviting us to become involved in the global project on Evaluating Capacity Development and for providing leadership and technical expertise in designing and carrying out the study. The organizations that supported the global project, particularly IDRC, ACIAR, CTA, GTZ and SDC are thanked for their financial support, provided indirectly through ISNAR, and for having the foresight to recognize the importance of this topic.

In addition, we wish to recognize the German Foundation for International Development and the Food and Agriculture Development Center, Feldafing and Zschortau, for having convened the workshop on policy, planning and coordination, held in Zschortau, Germany, in 2000. Many of the key players came together at this workshop to lay the foundations for cooperation in this case study.

Finally, we would like to thank the Technical Centre for Agricultural and Rural Cooperation (CTA) and the International Service for National Agricultural Research (ISNAR) for supporting the printing and distribution of this evaluation report.

Acronyms

ACIAR	Australian Centre for International Agricultural Research
AfDB	African Development Bank
BMZ	Bundesministerium für Wirtschaftliche Zusammenarbeit und Entwicklung
CGIAR	Consultative Group on International Agricultural Research
CORAF	Conference des Responsables de Recherche Agronomique Africains
CRI	Crops Research Institute
CSIR	Council for Scientific and Industrial Research
CTA	Technical Centre for Agricultural and Rural Cooperation
FAO	Food and Agriculture Organization of the United Nations
GPA	Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
GRENEWCA	Genetic Resources Network for West and Central Africa
IBPGR	International Board for Plant Genetic Resources
ICRAF	International Center for Research in Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
IITA	International Institute for Tropical Agriculture
INIBAP	International Network for the Improvement of Banana and Plantain
IPGRI	International Plant Genetic Resources Institute
IRRI	International Rice Research Institute
ISNAR	International Service for National Agricultural Research
NGO	nongovernmental organization
PGRC	Plant Genetic Resources Centre
PGRFA	Plant Genetic Resources for Food and Agriculture
SAFORGEN	Sub-Saharan Forest Genetic Resources Program
SDC	Swiss Agency for Development and Cooperation
WARDA	West Africa Rice Development Association

Executive Summary

Introduction

This study evaluated capacity development results and processes at the Plant Genetic Resources Centre (PGRC) in Ghana and examined the roles of various external agents in that development, particularly the International Plant Genetic Resources Institute (IPGRI) and the Genetic Resources Network for West and Central Africa (GRENEWECA). The study covered a period of approximately 20 years, from 1980 to 1999, but focused on recent evolution of the center since 1994.

PGRC

PGRC is mandated to coordinate plant genetic resources related activities in Ghana. Its objectives are:

- to collect and conserve the germplasm of the plant genetic resources of Ghana;
- to characterize, evaluate and document the collection;
- to encourage the use of its resources by breeders, researchers and farmers;
- to serve as a national coordinating agency for the exchange of plant genetic resources;
- to engage in research relevant to its mandate.

In pursuing these objectives, PGRC plays a vital role in improving Ghana's farming systems in an environmentally sustainable way, and has the potential to enhance local livelihoods.

The external capacity building agents

A number of organizations have contributed to capacity development within PGRC, including Ghanaian research, academic and nongovernmental organizations (NGOs), international organizations and bilateral organizations. However, two main players have been consistent and long-term supporters of PGRC's development over the past 20 years: the government of Ghana and IPGRI¹. The government of Ghana provides the budget for PGRC's researchers and support staff and most of the necessary physical infrastructure and basic operational expenses.

IPGRI is an international agricultural research institute and a member of the Consultative Group on International Agricultural Research (CGIAR). It promotes the conservation and use of plant genetic resources internationally by working closely with national programs and governments to help build their capacity for research into, and management of, these resources. IPGRI has provided various kinds of support to capacity development in PGRC, including technical training, collaborative research, equipment and other kinds of support over the last 20 years.

GRENEWECA is a more recent player in PGRC's development. The network was established in 1998 under the auspices of the West and Central African Agricultural Research Council for Development, and contributes to sustainable agricultural development in its member countries through collaboration to promote the conservation and use of the diversity of local plant genetic resources. Ghana is an active member of GRENEWECA and the Director of PGRC is the vice-chair of the GRENEWECA steering committee.

Approach and Conceptual Framework

The study was carried out by a team of three—one from PGRC, one from IPGRI and one from GRENEWECA—working within the context of the Evaluating Capacity Development project coordinated by the International Service for National Agricultural Research (ISNAR). The evaluation used a case study approach, and incorporated the International Development Research Center

¹ References to IPGRI include the Institute's predecessor organization, the International Board for Plant Genetic Resources (IBPGR).

(IDRC)/Universalia conceptual framework for capacity development as its theoretical structure (Lusthaus et al., 1995). This framework explains an organization's performance as a function of the interactions between its external environment, organizational motivation and organizational capacity dimensions. The partners developed a theory of action to explain the anticipated logical or causal links between the various capacity development efforts of the two external agencies (IPGRI and GRENEWECA) and the anticipated outputs from PGRC.

Data were collected from PGRC, IPGRI and GRENEWECA using several different methods:

- self-assessment workshops for senior and junior staff from PGRC, PGRC stakeholders and the GRENEWECA steering committee;
- interviews with high level officials from Ghanaian institutions;
- a survey and interviews with IPGRI staff and managers;
- a review of archival records from PGRC and external capacity building agencies.

Conclusions

The capacity of PGRC has grown appreciably over the 20-year period studied. The center has developed its infrastructure, acquired key administrative staff (e.g. financial managers, a librarian and computer services personnel) employed more technical staff, improved its research methodologies and engaged more national and international stakeholders. PGRC has also diversified its services and products (e.g. production and sales of planting material), which has increased the resources available to support its activities.

The government of Ghana played a substantial role in this development process through provision of land, payment of salaries and allocation of basic operating budgets. A significant improvement in the ability of the center to carry out its mandate occurred in 1994 when the government of Ghana granted PGRC the status of a semi-autonomous research center. This resulted in a direct funding allocation to the center and greater control of budgetary resources.

IPGRI contributed to the development of PGRC's capacity with a sustained commitment over a period of approximately 20 years. Although other external parties contributed to the capacity building process, IPGRI provided the most support over the longest period of time. The contributions of IPGRI include:

- increasing technical expertise by sponsoring long-term and short-term training for PGRC staff;
- strengthening infrastructure by providing basic conservation and research facilities;
- providing technical assistance to facilitate the introduction of new methodologies;
- providing publications that increase PGRC staff access to technical information;
- sponsoring collaborative research in innovative methodologies and technologies;
- promoting development of supportive plant genetic resources policy;
- helping to promote improved management practices and increased public awareness;
- promoting inter-regional collaboration by sponsoring the secretariat of the GRENEWECA network.

Although GRENEWECA has only recently become operational, it has contributed to the development of PGRC's capacity by:

- sponsoring collaborative research activities on germplasm collection and evaluation;
- training staff in documentation, project proposal writing and plant genetic resources management;
- raising awareness among PGRC stakeholders and decision makers of the importance of plant genetic resources for food, agriculture, health and economic development;
- promoting collaboration within member countries by sponsoring national plant genetic resources committee meetings.

The study indicated that the capacity of PGRC could be better developed in the future if improvement is made within four key areas:

1. Better identification of, and targeting towards, PGRC's needs

External capacity development assistance can be enhanced if it is targeted towards the needs and priorities of PGRC. In this way, capacity development interventions will be more focused on, and aligned with, the strategic goals of the center. A necessary step in this process is for the PGRC to identify and prioritize its own capacity needs. This study identified some of these priorities, including the need for additional infrastructure and basic equipment, fund raising and resource acquisition, partnership and collaboration, especially with Ghanaian stakeholders, and improving the linkage between conservation and use of germplasm.

2. A holistic definition of capacity development to include more than technical training

Capacity development should be defined broadly to include much more than technical training. Technical training remains a priority as does equipment and basic infrastructure, but it appears that management and strategic planning, fund raising, public awareness and policy are becoming increasingly important and should be considered as high priority for future capacity development. Capacity development should also include a balanced approach to capacity delivery mechanisms to include publications, training and workshops, personalized technical assistance, equipment and facilitated collaborative research.

3. Monitoring and evaluation of capacity development

Without assessment and monitoring, capacity development initiatives risk overemphasizing some capacity areas and underemphasizing others. Monitoring and evaluation are necessary if IPGRI and other external agencies with capacity development roles are to understand the needs of individual countries and focus capacity development on meeting those needs. However, the ultimate responsibility for monitoring and evaluation of capacity development rests with the PGRC to ensure that all capacity development efforts are directed towards institutional priorities.

4. A focus on building capacity within IPGRI and GRENEWCA as capacity development agents

The performance of organizations engaged in capacity development are affected by the same forces that affect PGRC, namely the external environment, motivational factors and capacity in terms of staffing and training. Virtually all IPGRI professional staff, for example, have some responsibility for capacity development. Skills and knowledge within PGRC should also be built so that staff can effectively carry out this role. The capacity of GRENEWCA to support capacity development in PGRC is constrained by resource limitations and additional external funding should be sought by the network to carry out its priority capacity development functions. However, in its efforts to acquire external funding, external support must be carefully balanced with member engagement and support, so that the network remains focused on member priorities.

Finally, the participatory approach to evaluation taken by this study built capacity for evaluation and an understanding about capacity development among the team members and their organizations and stakeholders. A participatory approach also helped ensure that results would be widely understood, which increases the likelihood that necessary changes will be embraced and implemented. This is likely to lead to a more capable and effective PGRC and more effective capacity development interventions in the future.

1. Introduction

Background

The Plant Genetic Resources Centre (PGRC) is mandated to coordinate plant genetic resources related activities in Ghana and to collect, characterize, evaluate, conserve and document national plant genetic resources. These resources are fundamental to making improvements in agriculture without threatening basic environmental systems, and thus are critically important to improving the lives of Ghana's people. Collection and conservation of plant genetic resources are necessary to protect the genetic diversity that is under threat from land degradation and other factors. Characterization, evaluation and documentation develop an understanding of the genetic character of the plant material conserved so that desirable traits, such as disease resistance or productivity, can be isolated and used to improve farming systems.

PGRC is one of the eight agricultural institutes of Ghana's Council for Scientific and Industrial Research (CSIR). It is located within 103 hectares of land at Bunso, a town in the East Akim District of the Eastern Region, 39 kilometers from the regional capital of Koforidua and 117 kilometers from Accra. PGRC was established in 1964 as a section of the Crop Research Institute (CRI) of the CSIR under the name Plant Introduction and Exploration Centre. Its function was to introduce exotic tropical species for trials in Ghana and to evaluate their economic potential as well as to assemble and maintain the germplasm of native plants. In 1985 its name was changed to the Plant Genetic Resources Unit to reflect the scope of its activities and to conform to international designation of similar institutes. In August 1994 the Unit's mandate was expanded and its status elevated to that of a center within the CSIR. The objectives of PGRC are to

- collect and conserve the germplasm of Ghana's plant genetic resources to guard against genetic erosion;
- characterize, evaluate and document plant genetic resources under conservation;
- encourage the utilization of the conserved resources by appropriate users such as plant breeders, researchers and farmers;
- serve as a central agency for the introduction and exchange of plant genetic resources;
- carry out research on any problems that may arise from any of the above activities.

The main external actors in the center's development have been the Government of Ghana, which provided the necessary skilled staff, infrastructure and other facilities, and the International Plant Genetic Resources Institute (IPGRI). IPGRI has been in existence since 1974 and is an institute supported by the Consultative Group on International Agricultural Research (CGIAR). IPGRI's mission is to promote the conservation and use of plant genetic resources to improve lives and livelihoods. Since the responsibility and authority for plant genetic resources rests with the countries themselves, IPGRI works very closely with national programs for plant genetic resources and national governments to help build their capacity for plant genetic resources research and management. In the case of Ghana, IPGRI has contributed to capacity development of PGRC by providing the center with conservation and research facilities, by training technical staff and through various other inputs.

A more recent contributor to capacity development at PGRC is the Genetic Resources Network for West and Central Africa (GRENEWCA), which was established in 1998 under the auspices of the Conference des Responsables de Recherche Agronomique Africains (CORAF). The network secretariat is based in the IPGRI sub-Saharan Africa office for West and Central Africa in Cotonou, Benin. GRENEWCA's goal is to contribute to sustainable agricultural development in its member countries through the conservation and use of the diversity of local plant genetic resources. The network aims to increase the effectiveness of each of its member country's plant genetic resources programs through regional collaboration.

Purpose, Objectives and Scope of the Evaluation

The purpose of the capacity development evaluation was to

1. analyze the development of PGRC's capacity to conserve, evaluate and utilize plant genetic resources, looking specifically at the human resources, facilities and methods for conservation that PGRC requires to effectively carry out its mandate;
2. illustrate and learn from Ghana's capacity development experiences. This knowledge could help to develop other national programs in West and Central Africa and possibly globally;
3. promote the evaluation of capacity development and build skills in conducting such analyses.

The study evaluated capacity development in PGRC over a period of approximately 20 years (1980–1999) during which time major growth and change occurred within the organization. The study analyzed the contributions of the Government of Ghana and other external factors, but focused on the contributions of IPGRI and GRENEWECA. The evaluation of IPGRI's contribution included a retrospective analysis of the institute's support to PGRC over a 20-year period and aimed to identify ways in which capacity development programs could be improved in the future. The focus of the evaluation of GRENEWECA's contribution was forward looking, focusing on collaborative problem solving among network members to plan for an effective capacity development program in the future.

The evaluation aimed to cover the entire development of PGRC. The following three dimensions were included:

- capacity for sustainable management and promotion of plant genetic resources, with an emphasis on conservation, evaluation and utilization;
- factors such as organizational capacity and performance and the external environment;
- the contributions of IPGRI and GRENEWECA.

The aim of the evaluation was not to assess the impacts of IPGRI and GRENEWECA in their capacity development efforts. Instead, the study focused on evaluating the development of capacity within PGRC and assessing the role and contributions of IPGRI and GRENEWECA in this process. Key concepts in capacity development are presented in Annex 1.

2. Evaluation Methodology

Approach to the Evaluation

The team adopted a case study approach to conduct the evaluation. This provided an appropriate framework to evaluate the many complex interactions and processes involved in organizational change and the interactions between different organizations. The case study approach was also useful in that it provided a means for analysis of the organization within its real life context (Yin, 1994). The case study included three major components, one focused on each of the organizations involved in the study.

Ghana component

The Ghana component of the evaluation included three self-assessment workshops: one for 13 major stakeholders and two for a total of 25 PGRC senior and junior staff² to assess the center's strengths and weaknesses, success factors and obstacles to success. A series of interviews were held with four high-level officials to capture their perspectives. The personal history of PGRC's Director was recorded in order to capture his perspective and role. Finally, archives and records were reviewed in order to assess staff changes, publications produced, infrastructure development and other factors that could be assessed quantitatively.

IPGRI component

The IPGRI component of the evaluation included a survey of IPGRI professional staff (13 in all) involved in capacity building programs. The purpose of the survey was to assess the extent of IPGRI's efforts to build capacity in Ghana and West and Central Africa, obstacles to success of the programs, factors contributing to success and suggestions for future improvements. Five key managers were interviewed to gain their insights into IPGRI's capacity development program and changes over time. Finally, archives and records were reviewed in order to assess IPGRI's contribution to training, infrastructure development and improved research methodologies.

GRENEWECA component

The GRENEWECA component evaluated the perspectives of nine network steering committee members through a workshop designed to elicit comments about how capacity development activities can be best supported by the network in the future. Archives and records were reviewed in order to assess the network's contribution to PGRC capacity development through training, research activities and supply of conservation equipment and other factors that can be assessed quantitatively.

Key questions

The following key questions guided the study:

1. How did PGRC develop the capabilities needed to achieve its goals and what contributions did IPGRI and GRENEWECA make to this development?
2. What processes did IPGRI and GRENEWECA employ to contribute to the organizational capacity development of PGRC?
3. What weaknesses still exist at PGRC that have not been adequately addressed by past capacity development efforts?
4. What did the evaluation reveal about the weaknesses in the capacity development interventions of IPGRI and GRENEWECA that should be addressed in future capacity development?
5. What lessons have been learned about evaluating organizational capacity development? How should organizational capacity development efforts be evaluated in the future?

² 'Senior' staff were defined as those having more than 10 years experience and 'junior' staff as those with less than ten years experience.

6. How did the evaluation contribute to increasing the effectiveness of capacity development efforts among the partners in the study?

Theory of Action

A theory of action links short-term objectives and longer-term goals and provides a theoretical framework against which progress can be measured. It therefore serves as the basis for structuring an evaluation, and is also known as the “impact pathway” or “impact chain” (Patton, 1997; Mayne, 1999). A theory of action establishes the links between activities and their expected contributions to capacity building, organizational motivation and the operating environment. In addition, a theory of action indicates how these activities are expected to lead to improved organizational performance; in this case the long-term goal of an effective program of conservation and sustainable use of plant genetic resources in Ghana. The theory of action for this study was constructed from a model of organizational performance developed by the International Development Research Centre (IDRC) (Lusthaus et al., 1995), combined with an international agreement—the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (GPA)—and the priority action areas identified by the Government of Ghana.

According to the IDRC model, organizational performance is defined as the achievements of the organization in relation to its objectives. The ability of an organization to perform depends upon three interrelated factors (see Figure 1): the external environment in which the organization functions, the motivation within the organization and the capacity of the organization. Capacity consists of the resources, knowledge and skills of the organization, and can include human resources, financial resources and infrastructure as well as strategic leadership and inter-organizational linkages. Motivation results from a positive internal environment and reflects factors such as organizational culture, incentives and rewards, leadership and management style, among others. These factors influence the direction of the organization’s activities and the level of energy that employees devote to carrying out the organization’s mission. The external environment includes the administrative and legal systems and the political, economic, social and technological environments in which the organization operates. The external environment can also influence motivation.

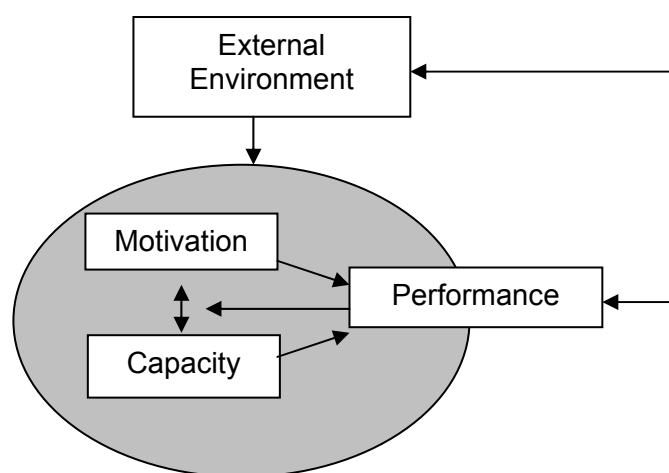


Figure 1. Interrelated factors of organizational performance

The GPA provides a clear framework of priority activities necessary for an effective program of genetic resources conservation and sustainable use (FAO, 1996). The GPA was drafted and adopted by 150 countries, including Ghana, at a technical conference on plant genetic resources in June 1996 in Leipzig, Germany. One of the aims of the GPA is to assist countries and institutions to identify

priorities for action that will strengthen their programs and enhance their organizational capacity. The plan established 20 high priority areas related to 4 categories: *in situ* conservation; *ex situ* conservation; utilization of plant genetic resources; and institutions and capacity building. Furthermore, indicators have been developed for each of the 20 priority action areas. Although still in draft form, the indicators have been reviewed by a number of IPGRI staff in headquarters and regional offices and were subjected to an initial testing by 100 countries with positive results (FAO, 2001). The 20 GPA activity areas and their indicators provide a reasonable standard against which national programs responsible for conservation and sustainable use of plant genetic resources, such as PGRC, can be evaluated. Therefore, they were used in this study (see Annex 3 for the GPA activity areas and associated indicators).

The performance of PGRC should be evaluated against its own mission, strategy and action plans. The center has identified the following high priority areas within the GPA (Government of Ghana, 2000) and it is against these priority areas that PGRC is evaluated in this study:

- sustaining *ex situ* collections;
- regenerating conserved germplasm;
- monitoring plant genetic resources conserved *in situ*;
- promoting plant genetic resources use;
- building a strong national program;
- constructing comprehensive information systems for plant genetic resources for food and agriculture;
- expanding and improving education and training;
- promoting public awareness of the value of plant genetic resources for food and agriculture conservation and use.

The effectiveness of IPGRI and GRENEWECA must be evaluated in terms of their contribution—or lack of assistance—towards improving the performance of PGRC within these priority areas. In addition to working directly with PGRC to improve capacity and motivation, IPGRI and GRENEWECA also work with different organizations involved in plant genetic resources management within Ghana and help to influence other dimensions of the external environment, such as policy. Figure 2 shows the inter-organizational relationships between PGRC, IPGRI and GRENEWECA.

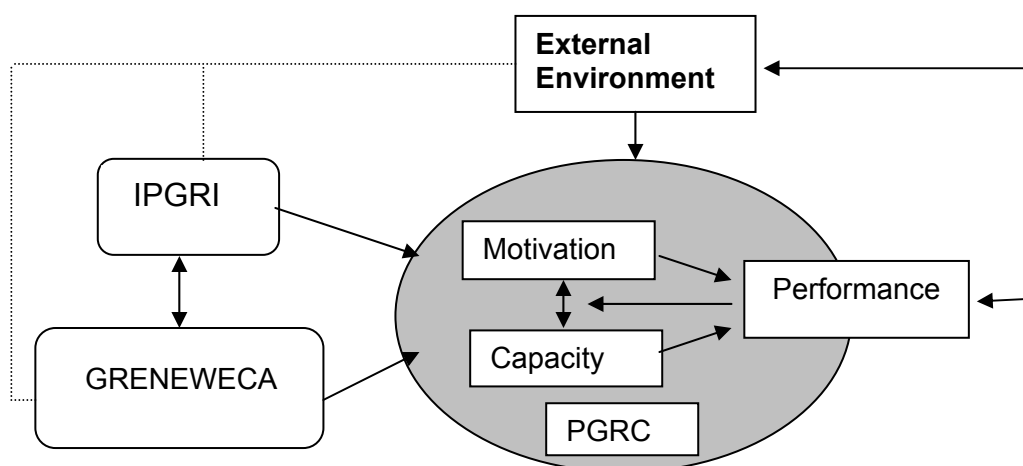


Figure 2. Inter-organizational relationships and factors of capacity development

IPGRI and GRENEWECA contribute to PGRC's performance through three broad categories: training, technical support and information services. These categories can be characterized in terms of the number of people reached and the intensity of the interaction (Horton et al., 2000). Priority has been given to strengthening national programs, supporting university programs in plant genetic resources, training related to planning and coordination, networking and supporting regional training programs. For example, in the case of strengthening national plant genetic resources programs, the contributions of IPGRI/GRENEWECA include:

- sponsoring and providing assistance in the convening of national workshops;
- providing conservation and communications facilities;
- developing and disseminating information related to national programs and policy issues;
- convening workshops on plant genetic resources policy and coordination;
- providing advice to international dialogues and negotiations related to plant genetic resources.

Figure 3 summarizes the theory and logic behind the capacity development effort, incorporating the IDRC model of organizational capacity development with the PGRC priorities and the IPGRI and GRENEWECA approach to capacity development.

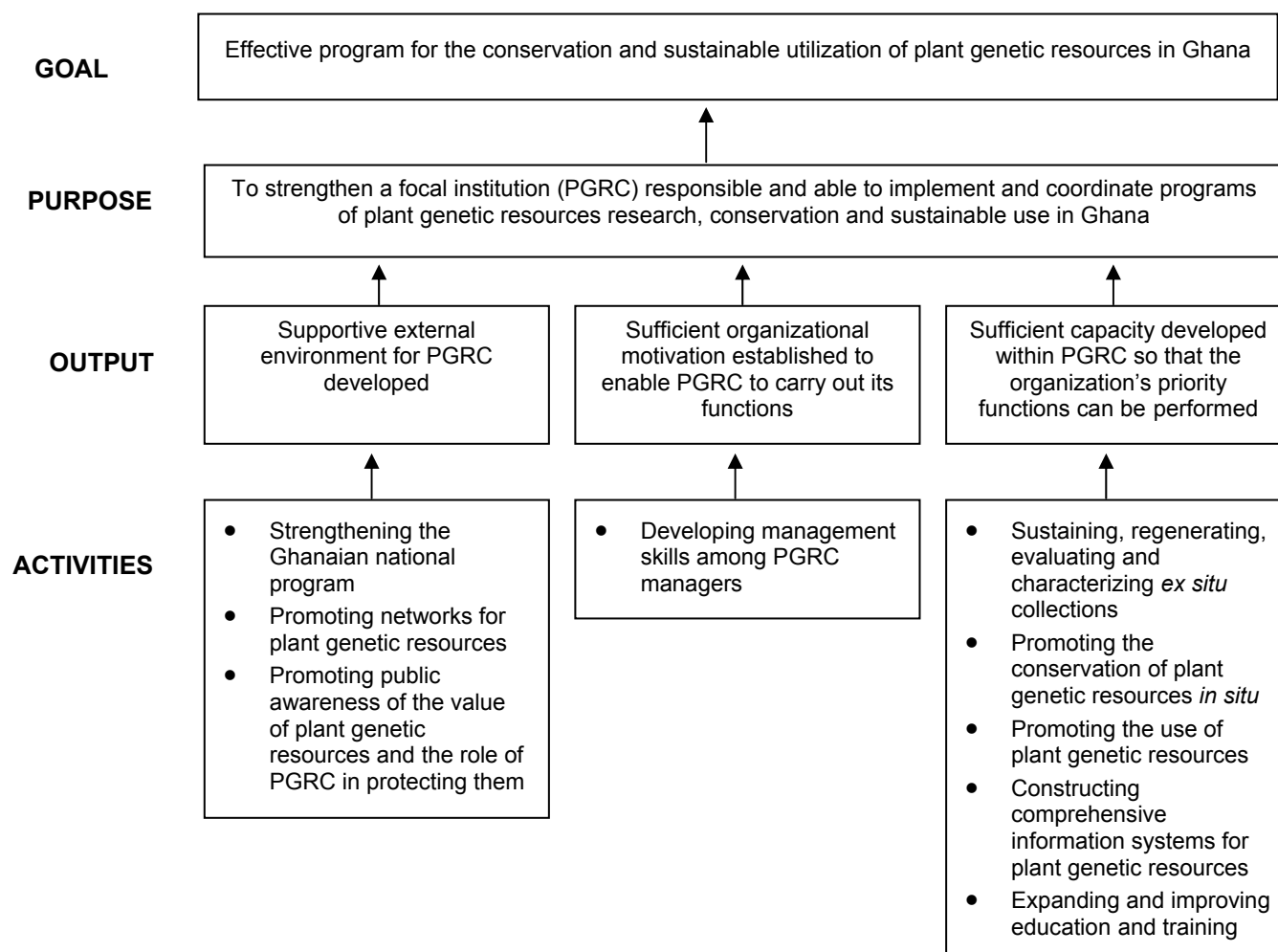


Figure 3. Capacity development theory of action

3. Capacity Development Progress

Development of Capacity at PGRC

Overall, the capacity of PGRC has been developed in a number of key areas such as facilities, staffing (numbers and disciplines represented), network membership, budget, collections held, accessions distributed, number of vehicles and amount of equipment. Table 1 summarizes some of the major areas of progress between 1994 and 1999.

Table 1. Capacities developed at PGRC in key areas

Area of change	1994	1999
Number of germplasm accessions conserved	2987	6468
Number of computers	1	6
Conference halls	0	2
Vehicles	4	6
Laboratory buildings	0	7
Membership in network	No subregional network in existence	PGRC head is steering committee chair
Autonomy	Unit within CSIR; no direct budget allocation	Semi-independent research center; direct budget allocation
Number of staff	116	129
Staff with PhD	1	3
Staff with Master's level degree	2	10
Staff with Bachelor degree	1	2
Fields of specialization represented within staff	5	16
Germplasm collected	1041 (1990–94)	2354 (1995–99)
Germplasm distributed	202 (1990–94)	1322 (1995–99)

Progress within the External Environment

Strengthening the Ghanaian national plant genetic resources program

The degree to which the external environment is developed to support the mission of an organization is an important indicator of the ability of the organization to meet its objectives (Lusthaus et al., 1999). The Ghanaian national plant genetic resources program is part of the context in which PGRC functions. Furthermore, PGRC serves as the official focal point and as such is responsible for building and maintaining the national program. For these reasons, the strength of the national program is an indicator of the effectiveness of PGRC.

Several indicators have been developed against which the status and progress of a national program can be measured (FAO 2001). The indicators include official recognition, creation of focal points and associated budgets, coordination among sectors, policy structure, participation in regional and international fora and others considered to be important in organizational assessment (Lusthaus et al., 1999). In 1995, Ghana had one of the best-developed national programs in West and Central Africa, since by that time a national workshop had been held and a formal program already established with PGRC as the focal point institution. Progress has been made in a number of areas since 1995. For example, Ghana is playing a key role in the GRENEWECA network. A national strategy was developed in 1997 and a second national workshop to coordinate activities was held in 1998.

Building government support

Government support has been essential to the sustained growth of capacity within PGRC, and has been complemented by outside support from various sources, including IPGRI and GRENEWECA. Countries responding to a survey by the Food and Agriculture Organization (FAO) also highlighted the importance of government support to plant genetic resources programs. These respondents thought that basic operating costs should be borne by governments to ensure a reasonably consistent level of funding over time (FAO 1998). In the case of PGRC, the Government of Ghana supports the cost of staffing, vehicles and facilities, and provides the land upon which the facilities are built and the field genebanks and arboretum are located. Government funding and other support have increased fairly steadily over the years as a result of awareness among high-level officials of the importance of germplasm conservation and the potential benefits of its use.

Much of the capacity development at PGRC can be attributed to government support for the status change in 1994, when the center evolved from a research unit within a larger organization (CRI) to a semi-independent research center. At this point, the PGRC began to receive its own budget allocation and undertook management and administration of its own affairs.

Diversifying support

Sustainability of an organization depends upon its ability to earn and maintain the loyalty and support of enough stakeholders to keep it functioning at a steady or growing rate (Morgan 1997). An organization that depends on one or a small number of sources for support faces the possibility of organizational collapse if the support is pulled away. Multiple sources of funding and resources indicate that the organization is responsive to the needs of stakeholders, since the more responsive the organization, the more likely that stakeholders will invest in it. Outside support does not always come in the form of funding. Other types of external support include equipment (such as freezers and computers), training, collecting mission sponsorship, technical assistance visits, information through publications and collaborative research projects. PGRC also raises money through the sale of planting materials and has a goal to produce 30 percent of its income from sales by 2002.

In the case of PGRC, the likelihood of sustainable support is increased because government support is complemented by other support. Support also comes from national stakeholders who are organized within the national program for plant genetic resources. PGRC plays a central and formally recognized role in the national program as the focal point for the country. This is an important factor in PGRC's capacity development because it provides a framework in which priority setting and coordination of national plant genetic resources related activities can take place and helps build support for PGRC. As the focal institution, PGRC also represents Ghana in regional and international fora on plant genetic resources and helps foster regional and international collaboration, which can also help to diversify and deepen support for the center.

Support has come from international and regional organizations such as IPGRI and GRENEWECA, and from others such as the World Bank, International Institute for Tropical Agriculture (IITA), International Center for Research in Agroforestry (ICRAF) and from bilateral donors including Korea, Japan and Germany.

Inter-organizational partnerships and networking

In Ghana, partnerships to carry out training, collaborative research and other capacity development activities have involved IPGRI and GRENEWECA in collaboration with other international agricultural research institutes, universities from other countries, bilateral development agencies, development banks, nongovernmental organizations (NGOs) and United Nations organizations.

Many organizations inside Ghana collaborate with PGRC. Research institutions, universities, private individuals and companies use the genetic materials conserved by PGRC in their crop improvement work. A number of others collaborate with the center to promote plant genetic resources conservation and use through the national program. Examples include the Crops Research Institute at Kumasi, the Oil Palm Research Institute at Kusi and the Forestry and Animal Research Institutes. The Forestry Department of the Ministry of Land, Forestry and Mines and the Department of Parks and Gardens collaborate in plant genetic resources conservation through the maintenance of protected areas, arboreta and botanic gardens. The Botany Department of the University of Ghana has tissue culture facilities for conservation and rapid multiplication of yam, cocoyam, plantain and other crops.

PGRC coordinates collaboration among all interested parties at national, regional and international levels. It maintains and strengthens Ghana's participation in multilateral efforts concerned with biodiversity issues through international organizations such as FAO. Regional responsibilities include:

- representing Ghana in various regional networks, such as GRENEWECA;
- interacting with other national plant genetic resources programs in West Africa to exchange information and germplasm;
- maintaining contact with international research institutes such as IPGRI, IITA, International Rice Research Institute (IRRI), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and West Africa Rice Development Association (WARDA) for technical assistance, germplasm and information exchange;
- developing national and regional project proposals for submission to donor agencies.

Raising public awareness

Senior PGRC staff reported that one of the center's main accomplishments has been to create public awareness about plant genetic resources conservation. All groups identified that increased information flow, better awareness among the general public about the importance of plant genetic resources and the publication of research findings had contributed to the success of the center. Several junior staff reported that scientists had been encouraged to be more sensitive to the importance of the conservation of germplasm.

Positive Change in Organizational Motivation

Developing management skills among PGRC managers

Development of management and strategic planning skills and employing them within the organization are necessary for maintaining organizational motivation, a key component of a strong organization. Management skills help leaders to make calculated and adaptive responses to internal and external environments (Lusthaus et al., 1995). Good management skills foster effective, efficient and sustainable use of organizational resources. Management decisions define the working environment for organizational processes—in planning, communication, decision-making, problem solving, monitoring and evaluation—and dictate the tone of interaction among employees of the organization. In order to have sufficient motivation within PGRC, its managers must have adequate skills in management and strategic planning and these must be applied.

The Head of PGRC, Dr. Bennett-Lartey, reported in an interview that the most important contribution of his career has been to manage the change in status from a plant genetic resources unit to an autonomous research center, and, hopefully in the very near future, into a fully fledged institute. This

positive attitude towards management and leadership was also reflected in comments from PGRC staff and stakeholders.

Senior staff reported that improved conditions of service and more staff employed, human resources development and training for all categories were important results. The senior staff also cited good management, increased efficiency of research work and increased productivity as factors contributing to the success of the center.

Junior staff reported that the stable working environment and “peaceful coexistence” were important. These employees identified a number of successes in this area including:

- good management over the years (implying consistency and continuity)
- good management policies
- good work environment
- good planning
- effective supervision of sectional heads
- efficient utilization of seed bank.

PGRC staff indicated that recruitment of more staff and employing staff with the right skills for the job were factors contributing to the center’s success. Staff also thought that the expansion of disciplines within the center was a positive factor. They cited dedication of staff to their work, devotion to duty, good coordination among scientists and collaboration between different research activities. The senior staff highlighted a number of areas related to staff motivation that had contributed to the success of the center, including constant salary, incentives and improved working conditions.

Stakeholders cited the motivation and commitment of PGRC staff and their hard work as success factors. They also mentioned the cooperative attitude of the staff and Director and the good human relationships. Both stakeholders and junior staff cited willingness and readiness of PGRC scientists to collaborate with scientists from other institutes. The junior staff also thought that good linkages between PGRC and farmers contributed to the center’s success.

Developing Technical Capacity

Advances in germplasm conservation

The number of accessions conserved *ex situ* at PGRC has increased substantially during the period of study, from 2,987 accessions in 1994 to 6,468 accessions in 1999. Eight germplasm collection expeditions, sponsored from various sources, were undertaken by the center from 1980 to 1999. The total number of accessions collected has increased during the period of study, from 875 samples collected between 1980 and 1984 to 2,354 samples collected from 1995 to 1999.

PGRC has also established and maintained a 16-hectare arboretum where both local and exotic timber, fruits, spices and other non-timber plant species are conserved.

Promoting germplasm use

To engage a larger population, PGRC encourages the utilization of its conserved germplasm. To carry out this mission, staff at the center provide extension services in addition to undertaking conservation work. PGRC stakeholders agreed that this was one of the concrete results of collaborating with the center. PGRC has supported the release of varieties, and is the source of seedlings, for some crops that are rare in Ghana (nutmeg was cited as an example). The greatest number of germplasm accessions distributed (1,322) occurred in the period between 1995 and 1999.

All PGRC staff and stakeholder groups recognized the production of seed and planting materials as a major accomplishment. The center produces and distributes planting materials to farmers, promotes the use of fruit trees and spices, provides basic plant materials for breeders and promotes the

cultivation of non-traditional crops. In addition to meeting goals related to the distribution and utilization of germplasm, commercial production of planting materials has helped PGRC to overcome funding shortages. The revenue obtained from selling farm produce between 1980 and 1999 progressively increased over the years. There was a large increase in revenue between 1990 and 1999 when sales reached a high of 191 million Ghanaian cedis (around US\$ 7600).

Training has been carried out since 1998 to strengthen the capacity of scientists, extension workers and farmers to produce seeds. In addition, PGRC has a program of commercialization. Regenerating, multiplying and selling fruit tree and spice seedlings has helped PGRC to generate funds to support its work, and now this is a policy of the parent institute, CSIR. As mentioned earlier, PGRC is expected to produce 30 percent of their income through sales by 2002.

Constructing comprehensive information systems for plant genetic resources

In order to effectively and efficiently conserve genetic material and then put it to use, basic information must be kept for each accession. This information must be readily retrievable to genebank managers and potential users. Lack of adequate and useful information about accessions was identified by the international community as a major constraint to using plant genetic resources (FAO, 1998). The development and maintenance of comprehensive information system was identified by Ghana as a high priority area (Government of Ghana, 2000).

Ghana reported that it has a common information system in place for plant genetic resources and seed stock data within the country and that training in plant genetic resources documentation and information has been provided since 1998. Information was originally stored manually, but after 1998 the center's information system was computerized through systems provided by IPGRI. PGRC staff recognized the progress made in information management as a major accomplishment. Stakeholders reported that one of the center's accomplishments was the provision of information on germplasm and planting materials.

Education and training

Senior and junior staff, and the PGRC Director, reported that a major accomplishment in terms of human resources development has been the provision of staff training. Training has been provided for all categories of personnel, not only for a select few. A Government of Ghana report confirms that a training strategy to address the GPA priority areas was established, that sufficient advanced level and short course training opportunities exist in the region and that plant genetic resources aspects have been sufficiently covered in existing courses (Government of Ghana, 2000).

Training took the form of short courses and support to both Master's and PhD level degree programs. The number of short courses offered to PGRC staff increased from 3 during the period 1980-1984 to 19 between 1995 and 1999. This training is reflected in the qualifications of PGRC staff, which increased overall during the period of study. For example, in 1980, only one person held a Master's level degree (MSc) and one a Bachelor of Science (BSc). By 1999, two held BSc degrees, ten held MSc degrees and three had Doctorates (PhDs).

The center has recently opened its own training facilities, with a conference room that can be used for training purposes and residence facilities for visiting trainees. Stakeholders and staff mentioned that the construction of this facility was a major accomplishment, which will allow the center to take on a greater role in plant genetic resources training in the future. Stakeholders also mentioned the accessibility of the center and its suitable geographic location for training as success factors.

Training is an area that has benefited from a wide range of support. For example, 32 short courses were delivered to PGRC staff between 1980 and 1999. Support for these courses was provided by international organizations such as the World Bank, several international agricultural research organizations and bilateral donors including the Korean and Japanese governments.

Contributions of IPGRI and GRENEWECA to Capacity Development

IPGRI and GRENEWECA contributed to the development of capacity in PGRC by providing facilities and equipment, training, information, collaborative research and support to national program development. This support built upon sustained commitment from the Government of Ghana and support from other donors and collaborators.

IPGRI provided support for a wide range of priority areas through training, information in the form of publications and direct technical assistance. IPGRI also entered into collaborative research agreements and conducted workshops to address areas of emerging interest. Assistance was provided to at least a minimal degree in all of Ghana's priority areas, including strengthening national programs, networking, public awareness, management skill building, *ex situ* and *in situ* conservation, germplasm use, information management, training and education. IPGRI also provided support for the secretariat and coordinator of GRENEWECA, which is significant in terms of staff time and monetary resources and indirectly contributes to capacity development of member countries such as Ghana.

IPGRI staff participating in the self-assessment highlighted two main strengths in the institute's capacity development program. One was the emphasis on providing basic conservation facilities. The second was the existence of the IPGRI sub-regional office for West Africa, which is available to work closely with the national program partner. The Director of PGRC also highlighted the importance of this sub-regional support.

IPGRI's contributions to capacity development in Ghana have been sustained for a period of approximately 20 years. Training is a good example. Archival records show that IPGRI has been providing training since the early 1980s and continues to provide training today. Although a number of other organizations have occasionally provided relevant training in Ghana (e.g. World Bank, international agricultural research centers and bilateral donors), no other organization has given the same sustained commitment over time. IPGRI also provided more short courses than any other training provider.

The nature of IPGRI's contributions to capacity development evolved over time, responding to changing circumstances and needs. Records indicate that the institute's early involvement was rather limited to technical assistance in collecting germplasm and conserving it in genebanks. In recent years, the portfolio of support has addressed a broader range of priority areas, including national programs, policy and the social dimensions of plant genetic resources. Because IPGRI and PGRC have similar missions (to promote the conservation and sustainable use of plant genetic resources) they are subjected to many of the same kinds of external forces and have had a parallel evolution as organizations. This combined history demonstrates the strong partnership between IPGRI and PGRC and may explain why IPGRI's capacity development interventions have evolved over time.

GRENEWECA began operations in 1998, and in spite of the network being in the early stages of its development, it has already achieved a number of objectives. Financial support from the African Development Bank (AfDB) has enabled the steering committee of the network to function and hold annual meetings to review activities and plan for the future. The network has contributed to the development and strengthening of national programs in various ways:

- supporting national committee meetings;
- supplying basic conservation equipment;
- supplying communication facilities;
- training scientists and technicians in plant genetic resources management;
- training national curators in documentation and geographic information systems;
- training the network steering committee members in project proposal writing;
- supporting Plant Genetic Resources for Food and Agriculture (PGRFA) exploration, collection and characterization.

The network also organized or helped to organize regional workshops covering the food plant fonio, public awareness, national program development and forest genetic resources management.

Strengthening the national plant genetic resources program

Seventy two percent of IPGRI respondents identified the establishment of national programs as an important result of their institute's capacity development work in West and Central Africa. IPGRI and GRENEWECA provide assistance and funding to support national workshops, as IPGRI did in Ghana in 1994 and in 1998 (Bennett-Lartey 2000). These workshops brought together stakeholders from the entire country to discuss biodiversity management and coordination between the various organizations involved in plant genetic resources related activities.

In addition to direct support to the national program, IPGRI and GRENEWECA play an important role in helping to strengthen policies related to plant genetic resources. For example, they supported two workshops on policy and coordination in West and Central Africa in which Ghanaian officials participated.

IPGRI and GRENEWECA also worked at regional and international levels to help strengthen the policy environment, which could ultimately have an affect upon national law and policy. IPGRI was an officially recognized observer and a provider of technical information to the working group for the International Undertaking on Plant Genetic Resources. IPGRI and GRENEWECA also developed and disseminated information related to national programs and policy issues.

IPGRI and GRENEWECA facilitated the participation of Ghana in regional and international dialogues and negotiations related to plant genetic resources, which can in turn influence the environment within which PGRC functions. For example, the GRENEWECA steering committee meetings are a forum for plant genetic resources related discussion and coordination between countries in West and Central Africa. Ghana plays a key role in the network since the Director of PGRC is the vice-chair of the steering committee and participates in all network meetings. Another recent example of this type of facilitation was an electronic conference organized by GRENEWECA, with the support of IPGRI and CORAF, held to discuss plant genetic resources legislation in Africa (Fondoun and Nnadozie, 2001).

IPGRI also played a key role in the preparatory process leading up to the International Technical Conference on Plant Genetic Resources held in Leipzig, Germany in 1996. Ghana and other countries prepared reports on the state of their plant genetic resources, and these reports were summarized into sub-regional syntheses. IPGRI provided technical assistance and logistical support to prepare the national and sub-regional reports and the preparatory meetings (FAO 1999). Ghana was an active participant in these processes and was a signatory to the Leipzig Declaration.

Support to networking and partnership building

One of the factors necessary for a successful network is motivation of the members. They must see network collaboration as being in the interest of their own programs, otherwise the chances of success are limited (FAO, 1991; Haverkort et al., 1993; Plucknett et al., 1993; Starkey, 1997). No national program in West and Central Africa is strong enough to carry out all activities related to its genetic resources. In fact, few formal national programs exist in the sub-region, while national level coordination is weak and national committees are often not established due to lack of funding and official recognition (FAO 1996). Virtually all countries in the sub-region fall into the category of low-income, developing countries, which means that annual per capita incomes are US\$785 or less (World Bank 1997). Because of limited national resources for plant genetic resources management, regional collaboration is considered to be an important mechanism to achieve tangible results. GRENEWECA steering committee members indicated that the countries in West and Central Africa appear to be motivated to participate in a regional network.

IPGRI clearly sees itself as strongly engaged in networking activities. Seventy eight percent of IPGRI respondents mentioned networking as an activity area related to capacity building. IPGRI sponsors the coordination of GRENEWECA and the sub-Saharan Forest Genetic Resources Program

(SAFORGEN) by providing IPGRI staff members as coordinators, housed at IPGRI and paid via the IPGRI budget, and by providing secretariat services. IPGRI supports networking in other ways, for example, an agreement with PGRC to support the organization and implementation of the second GRENEWECA steering committee meeting in February 2000. IPGRI sponsored the participation of its own staff and that of Ghanaian members to attend the second workshop of the International Bambara Groundnut Network in 1998. IPGRI also sponsored Ghanaian participants to attend the SAFORGEN Medicinal Tree Species network meeting in Cotonou, Benin in 1999.

Helping to raise public awareness

The need to raise awareness was discussed in depth by the GRENEWECA steering committee members during the self-assessment workshop. Awareness raising, directed towards the general public, policy makers and scientists, was thought to be an important factor in the success of the network in terms of contributing to the development of national programs. Equally, lack of awareness among policy makers and decision makers within national programs was thought to be an obstacle to national program development because it affects the funding contributions made by governments to their national plant genetic resources programs. Raising awareness is therefore important if support for national programs is to be increased. For these reasons, GRENEWECA steering committee members thought that public awareness should be a priority for future action.

Awareness raising is also a strategic priority for IPGRI. For example, one of IPGRI's strategic choice areas is "managing and communicating information" including public awareness. IPGRI aims to build support for the conservation and use of plant genetic resources at the local, national, regional and international levels (IPGRI 1999b). The institute aims to accomplish this through direct contact with policy makers, donors and those who influence them, including NGOs and the media.

Several respondents to the IPGRI self-assessment thought that raising awareness of the need to address plant genetic resources issues was one of the results that IPGRI has achieved in terms of capacity development in West and Central Africa. The following activities, specifically related to awareness raising in Ghana, have been carried out by IPGRI:

- supporting three workshops to raise awareness among policy makers about the importance of plant genetic resources (Abidjan and Zschortau);
- convening a high level workshop in Ghana in conjunction with IPGRI's management committee meeting to raise awareness in the country;
- publishing and distributing information resources to promote awareness of plant genetic resources (41 copies of three public awareness related publications were sent to Ghanaian recipients within the past 5 years).

Management skill building

Twenty seven percent of the IPGRI respondents cited management training for national program managers as an important activity in which IPGRI is engaged. The archival records confirm that IPGRI was involved in helping to build management related skills, although to a limited degree. Three Ghanaian participants attended the IPGRI/German Foundation for International Development workshop "Towards Sustainable National Plant Genetic Resources Programs Policy, Planning and Coordination Issues" held at the Food and Agriculture Development Center, Feldafing and Zschortau, Germany in May 2000. As the title suggests, this workshop dealt with issues related to planning and coordination, which are key management functions. IPGRI also sponsored and helped coordinate a similar workshop held in 1999 in Abidjan, Cote d'Ivoire.

Assisting germplasm conservation

IPGRI respondents to interviews and surveys cited the following activities and accomplishments in Ghana related to germplasm conservation, in which IPGRI was involved:

- providing basic conservation, communication and research facilities and providing associated training;

- developing *in vitro* storage protocols for important crops;
- establishing a program in Ghana for neglected crops;
- collecting germplasm, especially during the 1970s;
- distributing banana material from the International Network for the Improvement of Banana and Plantain (INIBAP) transit center;
- providing technical advice on germplasm issues;
- collaborating on a research project on *in vitro* conservation of African roots and tubers with the University of Ghana;
- collaborating on a Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) and Bundesministerium für Wirtschaftliche Zusammenarbeit und Entwicklung (BMZ) funded project on home gardens contribution to *in situ* conservation of plant genetic resources in farming systems
- collaborating on a United Nations Environment Program funded project on “Monitoring Genetic Diversity through Ethnobotanic and Genetic Erosion Studies for Effective Conservation Strategies of Crop Genetic Resources”;
- providing lectures and practical sessions at the United Nations University/University of Ghana international training courses on *in vitro* culture and conservation.

This list highlights the major activities in which IPGRI was engaged (i.e. technical assistance, collaborative research, banana germplasm storage for distribution and lecturing within training courses). It highlights the innovative work taking place in Ghana, including participatory monitoring of genetic erosion and *in vitro* conservation, as well as the collaborative nature of the work.

In terms of physical resources, IPGRI provided PGRC with basic storage equipment such as deep freezers, gel, aluminum foil and a stand-by generator—equipment that was badly needed in the center’s early days. The equipment is still in use and has helped to give impetus to the center for further physical resource development. IPGRI staff members recognize the provision of equipment as a traditional activity and 50 percent of IPGRI respondents cited equipment or facilities as an activity area in which the institute is involved. The majority of inputs from IPGRI, in terms of letters of agreement, training, workshops and technical assistance, are directed towards *ex situ* conservation. Out of 67 records, 61 percent represented support provided to *ex situ* conservation activities. IPGRI also provided a number of publications related to *ex situ* conservation.

IPGRI contributed to diversification of crop production and within crops by supporting collaborative research programs on home gardens, African leafy vegetables and *in situ* conservation. IPGRI’s staff regarded the institute’s emphasis on traditional vegetables and neglected crops as a particular strength of its programs.

Promoting germplasm use

IPGRI is supporting the work of INIBAP in a project to introduce improved bananas and disease-free banana planting material in the peri-urban zones of Ghana. Other projects, particularly the work with home gardens, leafy vegetables and *in situ* conservation, have dimensions that promote germplasm use.

Information management

In addition to providing computer equipment, IPGRI/GRENEWCA have provided information system development training and technical assistance. For example, in 1982, IPGRI sponsored the participation of a participant from CRI to attend a training course on documentation management for genetic resources.

During training courses on *in vitro* conservation of root and tuber crops organized by the University of Ghana in 1998 and 1999, lectures on documenting plant genetic resources were given by IPGRI and GRENEWCA. IPGRI publications related to documentation were distributed to the participants and to national trainers. Documentation software was installed on a new computer bought by GRENEWCA for the Botany Department of the University of Ghana.

Promoting training and information

IPGRI clearly played a key role in providing training to PGRC. The institute began providing training in the early 1980s and continues to this day. Although other organizations have occasionally provided training related to plant genetic resources in Ghana, no other organization has had the same degree of commitment over time. IPGRI also provided more than twice as many short courses overall than any other training provider and supported two of the three Master's degree programs undertaken by PGRC staff.

IPGRI staff are aware that their institute plays an active role in training, with 67 percent of all respondents identifying training as an activity area. Many of the respondents thought that training was one of the institute's capacity development objectives. In fact, IPGRI's training objectives included developing a cadre of trained personnel to implement plant genetic resources activities, building capacity within national programs to conduct their own training, providing information services to the region, and building sub-regional university courses on plant genetic resources. A review of the archival records confirmed that IPGRI has been involved in a number of activities related to building training capacity in Ghana over the years, including "training of trainers" workshops, training for extension workers, follow-up training for MSc alumni and scientific writing courses.

IPGRI also promotes learning through publishing and distributing information. This activity was widely recognized by IPGRI staff as an important area of the institute's work. Some specific activities mentioned include:

- responding to requests for bibliographic services;
- distribution of plant genetic resources abstracts;
- assisting the partners in writing scientific articles;
- distributing technical information;
- distributing publications.

A search of the records of publications sent from IPGRI through mailings or through subscription showed that over the past 5 years 31 publications have been mailed to 197 recipients in Ghana. Publications covered a wide range of topics from policy to *ex situ* and *in situ* conservation techniques and practices.

4. Areas for Improvement

External Environment

National plant genetic resources program

As described in section 2, the ability of an organization to perform is highly dependent on a supportive external environment. Equally, a non-supportive external environment can limit the ability of a center to accomplish its mission. In the case of PGRC, obstacles to success were reported to be related to government policy and globalization, both of which tend to promote the fast spread of new varieties of some species and the displacement of landraces by improved varieties. The 1995 country report prepared by Ghana in preparation for the International Technical Conference on Plant Genetic Resources in 1996 identified policy as a high priority, but it appears that policy remains an obstacle.

Although it has ratified the Convention on Biological Diversity and other international agreements, Ghana has yet to formulate appropriate policies on the conservation and use of plant genetic resources. The model of organizational development used in this report and the experiences of the respondents emphasize the importance of translating these international agreements into policy and legislation at the national level. Particular areas recommended by the GPA for attention include plant variety protection, plant genetic resources access and benefit sharing, farmers' rights and policies for *ex situ* and *in situ* conservation.

Despite IPGRI's contributions in the area of building supportive policy, several IPGRI respondents identified that lack of sufficient policy support was a weakness in the institute's efforts to support national programs. Limited resources have also been devoted to building capacity in how to design and carry out awareness raising activities within individual countries, even though this was seen as a high priority.

Coordination and collaboration is another area in which greater progress is needed. In Ghana, the national program lacks coordination among plant, animal and forest genetic resources, and there is insufficient involvement of farmers and the private sector in national coordination. GRENEWCA steering committee members identified inadequate coordination within national programs and inadequate functioning of national plant genetic resources committees as two factors that limit the ability of the network to assist national programs.

PGRC respondents identified the lack of a reliable power supply and insufficient telecommunications as obstacles to improved organizational performance. A reliable power supply is vital as PGRC's mission of conservation of germplasm is largely achieved by deep freezing. Power failures threaten the long-term viability of the accessions being conserved, and thus the ability of the center to carry out its mission successfully. The need for a stand-by generator was recognized in 1995 and a small capacity generator was acquired which partially meets this need.

Lack of communications infrastructure (including internet access) was identified by PGRC respondents as another limiting factor. Poor communications at the national level was also identified by GRENEWCA steering committee members and by IPGRI staff as a major obstacle to developing the network and assisting national programs. Stakeholders mentioned poor transport facilities. Senior PGRC staff thought that government funds were inadequate and were not released in a timely way.

IPGRI staff identified a lack of a focused approach to national program development as a weakness in the institute's capacity building program. The respondents thought that capacity development could be improved by gaining a better understanding of national program needs and targeting efforts to meet those needs. Additionally, a lack of adequate financial support was raised as a weakness in the overall effort, as well as a failure to build sustainable programs with adequate follow-up. Several respondents also noted monitoring and evaluation of capacity development as weaknesses.

Despite the importance of local contact and direct support as a part of IPGRI's capacity development approach, 44 percent of the IPGRI respondents thought that the institute did not have enough staff in regional or sub-regional offices with direct responsibility for capacity development among national program partners.

Networking and stakeholders

Although the GRENEWECA network has made some contributions during its few years of existence, the benefits of networking within the region to support national program goals have not been fully exploited. Probably the highest priority for GRENEWECA is to raise funds for priority activities. No secure source of funding presently exists, except for IPGRI support to the Secretariat. Thanks to the financial support of AfDB (1999-2001), the steering committee of the network is functional and meets annually to review activities and plan for the future. Funding has been sought for donor support to a general assembly of network members and for some activities, but at the time of writing, no donor has been found to contribute start-up funding for the network. However, national program motivation also arose as an obstacle to networking in the region. Country-level response to network initiatives was seen as insufficient, including slow or inadequate reaction and limited follow-up.

One IPGRI respondent identified that there are inadequate coordination mechanisms among different networks operating within the region. It was suggested that better collaboration in the future could be built. These could include the United Nations University in Accra, linking strong countries with weak, improving collaboration with other centers of the CGIAR, improving links to French universities for French speaking West Africa, and promoting linkages between Ghana and the rest of the region.

In Ghana, capacity development efforts of IPGRI and GRENEWECA have been undertaken with several different organizations implicated in plant genetic resources within the country in addition to work with PGRC. Most of these interactions have been with other government institutions, closely followed by universities. Although the range of stakeholders with whom IPGRI has been involved includes Ghanaian producers' groups, NGOs and regional and international organizations based in or active in Ghana, findings indicate that more attention could be given to collaboration with these types of partners.

Management and Motivation

In addition to praising the management, PGRC staff identified some weaknesses. Both senior and junior staff felt that salaries are low and incentives are insufficient, while junior staff mentioned low job satisfaction. Both groups cited inadequate information flow as a weakness.

Staffing at PGRC has become more diversified in recent years, with administration, information management, extension and other disciplines now added to the formerly exclusive professional disciplines of agriculture and plant genetic resources. Future diversification is likely as the center reflects changing priorities such as public awareness, policy and *in situ* conservation on farm and in home gardens. Raising public awareness was seen by PGRC staff members as a necessary area of emphasis in order to increase support for the work of the center. Similarly, lobbying key government officials was seen as a means of increasing funding support. These interests imply that staff skilled in areas such as law, political science, communications, anthropology and marketing would be an asset.

Changes within IPGRI staffing provides a useful comparison, since the two organizations are responding to similar needs and changes in priorities. A recent analysis showed that between 1979 and 1999 the profile of IPGRI staff has changed (IPGRI 1999). In 1979, 100 percent of the professional staff were trained in the crop sciences. By 1999, 57 percent were from the crop science disciplines, 9 percent from forestry, 16 percent from information sciences and 10 percent from the social sciences.

Technical Capacity

All three PGRC respondent groups (senior staff, junior staff and stakeholders) thought that staffing was inadequate in terms of having specialists with the necessary skills and knowledge for key areas of research. They also cited the lack of a reliable power supply (see section 4). The group of senior employees thought that working tools and equipment were insufficient or inadequate. PGRC staff identified the following specific obstacles:

- lack of a cold storage room
- need for additional laboratories for research work (especially a tissue culture laboratory)
- no dehumidified room for drying
- lack of appropriate equipment
- insufficient working materials.

Despite IPGRI's contributions to building capacity in conservation efforts, several IPGRI respondents thought that a weak link currently exists between conservation of plant genetic resources and the use and economic benefits of conservation. More efforts are needed in these areas in the future.

PGRC currently lacks the communications infrastructure needed to access international plant genetic resources databases. The lack of adequate communications facilities was raised in several other contexts and is also considered to be an obstacle to managing, gaining and sharing information about accessions.

IPGRI and GRENEWECA have only provided limited support to information management. Only one publication related to information management was distributed from IPGRI headquarters (not including those requested from Ghana) over the past five-year period. The publication entitled "Characterization and Documentation of Genetic Resources Utilizing Multimedia Databases," published in 1998 was sent to three people in the country.

GRENEWECA steering committee members indicated that genuine needs still exist for training in topics related to plant genetic resources conservation and use and that a lack of trained personnel is a factor that inhibits the development of national programs.

5. Conclusions

Although capacity development has become a prominent issue in recent years, much remains unknown or untested in terms of how external players, such as IPGRI and GRENEWECA, can best intervene to develop capacity in organizations such as PGRC (Bossuyt, 1995; Schacter, 2000). In fact, capacity development was absent from the terminology of IPGRI as recently as 1994 (IPGRI 1994) when the institute focused more on technical training, albeit in the context of support to national programs. However, this study indicates that further development of capacity at PGRC would benefit improvement within four key areas:

1. better identification of, and targeting towards, Ghana's needs
2. a holistic definition of capacity development to include much more than technical training
3. monitoring and evaluation of capacity development
4. a focus on building capacity within IPGRI and GRENEWECA as capacity development agents.

Strategic Planning and Priority Setting

During data collection on capacity development within IPGRI and GRENEWECA, respondents were asked to make suggestions for improving capacity development efforts. The strongest convergence of opinions arose around the need to increase the understanding of the capacity needs of client organizations, and to target capacity development efforts more directly towards meeting those needs. There is no record to indicate that a systematic needs assessment was ever conducted for Ghana, or that monitoring is regularly done. The IPGRI self-assessment respondents confirmed this.

Although IPGRI, and to a lesser extent GRENEWECA, have been involved in capacity development quite broadly, there has been a disproportionate focus on a limited number of priority areas. Furthermore, this limited set of topics tended to receive the most intensive treatment over time. The majority of attention has been focused on *ex situ* conservation, including 76 percent of the training programs, 45 percent of the publications distributed and 71 percent of the technical assistance visits on record. Gaps appear to exist in terms of capacity in management skills, networking, germplasm use and information management. The need to raise funds was also recognized as a priority, but no efforts have been directed towards increasing the capacity of PGRC to raise funds, except, indirectly, through public awareness related workshops. On the conceptual side, two out of five IPGRI managers thought that there was too weak a link between conservation and use of plant genetic resources.

Continuing importance of infrastructure and basic equipment

Ex situ conservation, and the facilities to support it, remains a high priority for PGRC. Both staff and stakeholders made several recommendations that would improve the capacity of the center to conserve accessions *ex situ* including better facilities for germplasm storage, regenerating all plant genetic resources accessions with low viability, maintaining field genebanks and establishing a network of holders and a directory of holdings. A backup generator remains a high priority because it would resolve the problem of power cuts and failures through the central power grid.

Improved telecommunications would enhance PGRC's ability to communicate and collaborate with Ghanaian, regional and international partners. It would also allow staff to have greater access to relevant information. Advances in telecommunications technology could provide the means by which PGRC could improve its communications with less reliance on the national telephone system.

Both PGRC staff and stakeholders cited the need for additional research facilities and laboratory materials. Specific areas of need include working tools, cold rooms, irrigation facilities, adequate stationery, a tissue culture facility and substations in all ecological zones.

Fund raising and resource acquisition

All three groups within PGRC, GRENEWCA steering committee members and several IPGRI staff identified the need to increase funding and resources to support PGRC. Fundraising through both external and internal sources was suggested. External sources include funds from commercial activities and through participation in international projects. In addition to raising new resources, respondents suggested more judicious use of available resources, better programming and planning and efforts to assess the work that has been done. Once project results are available, they should be published to raise the image of the center and its partners and to help build support for PGRC and its work.

PGRC staff and stakeholders thought that lobbying the Government of Ghana would be one way to gain funds and support. Junior PGRC staff suggested that parliament should be lobbied through the CSIR to establish a research fund to support the work of the center and to generally increase the contribution of the government to PGRC. Some saw the lobbying role as directly from the CSIR to parliament and others identified the target of lobbying efforts as “policy makers.”

Improving partnerships and collaboration

Despite the relatively advanced development of the national program, even greater attention should be paid to linkages and networking between stakeholders in Ghana. Although farmers’ associations and the private sector often play an important role in the use of germplasm, their involvement in setting priorities and developing strategies for plant genetic resources is limited. Stakeholders thought that greater coordination could be a means of overcoming obstacles, particularly resource shortages. Another forum or workshop of stakeholders was recommended as a means of increasing coordination.

More collaborative research projects should be developed, starting with joint development of concept notes, then soliciting funding and finally, the active involvement of several parties in carrying out the research. Stakeholders emphasized that the chain is only as strong as its weakest link, and some of the stakeholder organizations are poorly funded. Attention should be given to increasing the flow of resources to collaborating organizations as a part of national strategy. In addition, the development of a national directory of germplasm holdings and a national assessment of plant genetic resources activities would be means of increasing information sharing and building collaboration at the national level.

This study showed that a capacity development effort that targets Ghana’s national program needs must address a wide range of areas, including administration, policy, fund raising and management. Some of these areas are outside the traditional mandate or area of expertise of a technical institute such as IPGRI. For example, skill building in strategic management does not match well with IPGRI’s staff profile and the institute may not be best suited to respond to that need. However, IPGRI does have a role to play in supporting the development of management capacity, as demonstrated by the recent management related workshops sponsored by the institute in collaboration with a number of other organizations. But, instead of having expertise within its own staff to respond to every national program need, IPGRI’s role should be to help the national program identify and monitor its own needs, to identify potential partner organizations that can offer needed expertise and to help the national program raise funds and other resources to bring in assistance. Within the CGIAR system, management skill building falls within the mandate of IPGRI’s sister center, the International Service for National Agricultural Research (ISNAR). In the case of the need for capacity related to organizations and management, ISNAR could be a key partner, helping IPGRI to respond to national program needs. Efforts should be made in the future to develop this partnership further for the benefit of national plant genetic resources programs.

Improving the linkage between conservation and use

Greater effort to link conservation and use was thought to be a means of engaging more stakeholders in plant genetic resources and moving genetic resources from a fringe activity to a mainstream activity, by raising awareness and political support. Both PGRC staff groups recommended that the

center should continue to be active in production and distribution of planting materials as a means of generating funds and promoting the use of germplasm. PGRC staff also suggested that genetic diversity could be increased in the short term by producing and promoting indigenous leafy vegetables, identifying underutilized crop species for conservation, increasing production of planting materials and mass propagation of non-traditional crops for export.

IPGRI has contributed to diversification of crop production and diversity within crops by supporting collaborative research programs on home gardens, African leafy vegetables and *in situ* conservation. IPGRI's emphasis on traditional vegetables and neglected crops was seen as a particular strength of its programs. Specific areas of work in Ghana include assessing the agro-biodiversity that is maintained in Ghanaian home gardens, quantifying the uses and value of this diversity to household food security and identifying key species with significant genetic diversity that are best conserved in home gardens. IPGRI promotes this work in Ghana through letters of agreement to collaborate, training, workshops and technical assistance.

Several respondents thought that more attention should be paid in the future to *in situ* conservation, neglected crops and linkages between conservation and use of plant genetic resources. One IPGRI respondent thought that IPGRI and its partners should improve their conceptual understanding of the links between conservation and use and then make stronger efforts to integrate use into plant genetic resources programs.

Defining Capacity Development Holistically

A strategic approach to capacity development should include a broad definition of capacity development that includes, but is not limited to, technical training. The three dimensions of the Lusthaus model (external environment, motivation and technical capacity) could provide a useful framework for any capacity development strategy. Technical training remains necessary and important, but skills in management and strategic planning, fund raising, public awareness and policy are becoming equally vital. The social dimensions of plant genetic resources are also important and capacity must be built in this area. PGRC could use the Lusthaus model to develop its own strategy for capacity development, which could then be used to guide the interventions of organizations such as IPGRI and GRENEWCA.

Intensity of interaction influences the effectiveness of capacity development assistance (Horton et al., 2000). Publications have a wide reach, but are low intensity and therefore limited in their ability to influence. Training and workshops are of an intermediate level of intensity and have a more limited reach, but are more likely to influence thinking and behavior. Intensive interactions such as personalized technical assistance and facilitated collaborative research reach a small number of people, but can have a sustained impact over time. IPGRI's intensive interactions tended to be concentrated in conservation rather than in other priority areas such as information management, public awareness and national program strengthening. A holistic approach to capacity development would include a balanced approach to capacity delivery to ensure that intensive interactions take place to some extent for all priority areas.

Monitoring and Evaluating Capacity Development

PGRC should assess its own capacity needs systematically and periodically monitor progress towards meeting those needs. Without assessment and monitoring, capacity development initiatives cannot be strategically undertaken, with the risk of overemphasizing some capacity areas and underemphasizing others.

Monitoring and evaluation are necessary if IPGRI and other external agencies with capacity development roles are to understand the needs of individual countries and focus capacity development on meeting those needs. Failure to adequately monitor and evaluate the institute's capacity development work was cited as an obstacle by 22 percent of the IPGRI respondents. However,

monitoring and assessing needs and priorities are essential roles for PGRC as the national focal point for the Ghanaian plant genetic resources program.

An initiative is now underway, in collaboration between FAO and IPGRI, to develop a set of indicators of GPA implementation and a monitoring system (FAO 2001). Ideally, this initiative will establish a system whereby countries such as Ghana can monitor their own progress. The primary beneficiaries of such a system would be countries and organizations, such as PGRC, with responsibility for national plant genetic resources programs. IPGRI and GRENEWECA could also benefit from this kind of information to help them make decisions about capacity development interventions.

Building Skills within IPGRI and GRENEWECA for Capacity Development

As shown in Figure 4, the performance of IPGRI and GRENEWECA as institutions engaged in capacity development is affected by the same kinds of forces that affect the performance of PGRC, namely the external environment, motivational factors and capacity in terms of staffing and training. Experience suggests that many organizations that provide development assistance are not well prepared to undertake capacity development programs either in terms of staff capacity or in terms of methodologies or strategies of approach (Bossuyt, 1995; Schacter, 2000). These studies suggest that staff positions should be created to address issues related to organizational development and that budgets should be allocated and staff recruited who have knowledge of organizations and their development.

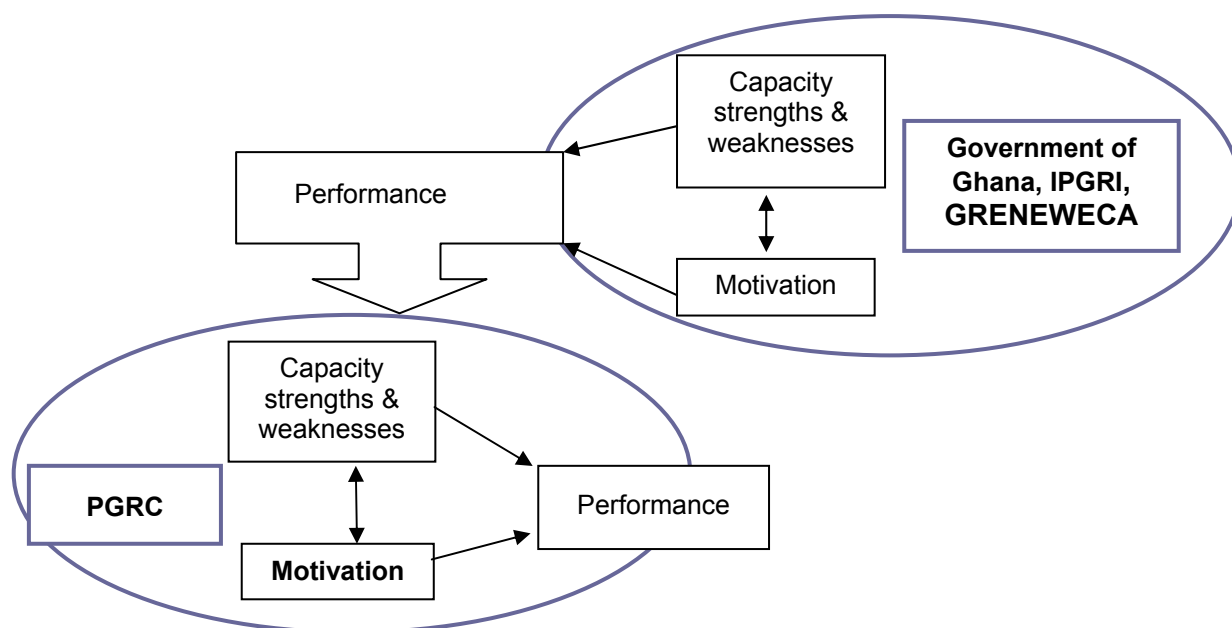


Figure 4. Development of capacity at PGRC and the contributions of the Government of Ghana, IPGRI and GRENEWECA

IPGRI has not always been able to provide enough qualified staff to support its capacity development work. Between 1987 and 1992, IPGRI employed a full time training officer. Yet in 1992 when the last training officer left the institute, the post was frozen due to budgetary constraints. In the meantime, the duties of this post were assumed, to varying degrees, by support staff, temporary professional staff and an associate expert. Training responsibilities were also assigned to regional office focal points. Eventually, a new full-time training officer was appointed in May 2001. While these arrangements probably increased the total person hours dedicated to training in the institute, it may have left gaps in

terms of expertise, knowledge and strategic leadership in the area of training and capacity development. Self-assessment surveys used for this evaluation concur with past reviews that adequate staffing for capacity development is necessary and that previous efforts have been less than satisfactory.

Virtually all IPGRI professional staff have some responsibility for capacity development. This means that a basic level of understanding should be built about capacity development and the ways and means of coordinating the capacity development efforts of individual projects to address national program needs. This implies that a comprehensive capacity development strategy in IPGRI should include training of IPGRI staff to develop this understanding.

IPGRI respondents identified a need for evaluation skills and for more staff to be available to work directly with national programs. IPGRI has begun to address the need for evaluation skills in the institute with the recent hiring of an impact assessment and evaluation specialist and the development of a strategy for IPGRI in this area, but more should be done to build capacity throughout the organization. A suggestion was made to increase the number of staff and funding support to the Benin sub-regional office and to develop “associate expert” positions to provide more direct support to national programs.

GRENEWECA steering committee members offered some ideas for overcoming obstacles to regional collaboration. These include greater investment in collaboration at the regional level, developing stronger regional mechanisms for sharing responsibilities on plant genetic resources management, making better use of existing facilities at the national, regional and international levels, better assessment of country needs, monitoring national follow-up and providing incentives to motivate national scientists.

Additional external funding support should be sought to meet network priorities and efforts are underway to acquire other external funding. A number of studies evaluating network effectiveness have found that effective networks balance external support with internal support in order to build the network firmly on the basis of member leadership and sustainable commitment (FAO, 1991; Haverkort et al., 1993; Plucknett et al., 1993; Starkey, 1997; Watts, 2001). These studies suggest some key questions for GRENEWECA to consider as it seeks external funding support for its program:

1. Is the network's existence based on continuing commitment by an external donor that may not be available on a long-term basis?
2. Is external funding balanced by resources contributed by network members?
3. Is external funding channeled toward activities that help the network meet its goals and objectives and established program of work?
4. Does the network expect, provide the means for, and recognize the contribution of resources (staff, facilities, membership dues) by network members?

6. Lessons about Evaluating Capacity Development

The methodologies used in this study, i.e. self-assessment workshops, surveys, interviews and archival record review, were useful means of assessing capacity development. PGRC staff saw the self-assessment workshop as an opportunity to participate in shaping the future of the center in the hope that it would lead to changes or improvements. Disagreements on particular issues occurred during the discussions, indicating that people felt free to express themselves even if they did not agree. The same was true concerning interviews with IPGRI managers and questionnaire responses as well as in the GRENEWECA workshop. All methods seemed to be taken seriously by the respondents, who spoke freely, disagreed openly, addressed positive and negative issues and were forthcoming with opinions and ideas. Interviews initially scheduled for an hour were often extended as the respondents wished to address each question in depth.

The self-assessment approach appeared to be a means of increasing the effectiveness of capacity development efforts among the partners in the study. First and foremost, the evaluation increased the knowledge among staff within the participating organizations about what capacity development is, what successful capacity development involves, and how capacity development can be evaluated. The study team learned the most. Two members of the team had virtually no previous experience with this type of study and the third member's skills were greatly increased after participating. The team also worked together to develop a theory of action for capacity development and to adapt the evaluation framework to the needs of the three participating organizations. This increased their understanding of capacity development as a field of endeavor.

The evaluation also increased the awareness of stakeholders, staff and managers of the organizations involved about capacity development and ways and means of evaluating it. Several IPGRI managers played key roles, for instance helping to design the survey and reviewing draft documents. As a result of the evaluation, a seminar was held at IPGRI headquarters for local staff and other interested parties to raise the general level of awareness. A post-workshop mini-evaluation was conducted to assess any change in awareness levels. Participants were asked to rate their level of knowledge of the evaluation of organizational capacity development prior to, and after, the workshop. Prior to the workshop, 11 out of 13 participants said they were not at all informed about evaluating capacity development, whereas after the workshop, 6 people felt they had some information about the topic and 7 responded that they were well informed.

Limitations in the Methodology

The evaluation tried to capture lessons about the progression of PGRC over a long period of time, without having had the benefit of other analyses conducted during that period. This highlights the need to establish regular monitoring systems and to undertake periodic evaluations, so that change can be better tracked over time. PGRC staff and stakeholders were questioned about the need to conduct future evaluations of capacity development in PGRC or their own organizations. Most staff and stakeholders participating in the workshops thought that future evaluations should be conducted at the center.

Strong indicators are needed for the assessment of capacity development and more time should have been allocated for the evaluation team to discuss this issue. The initial workshop in the Philippines established a good base for the evaluation, but more help was needed to develop the assumptions, indicators and theoretical framework in a participatory manner. The indicators developed by FAO to monitor the GPA implementation are limiting in that they focus on inputs rather than outcomes or long-term goals.

The methodology did not include a direct assessment of the extent to which PGRC's mission is clearly articulated, accepted and used as the basis for a strategy. In addition, leadership, management,

strategic planning, roles and decision making within the center were not assessed. Key questions that might have been raised include (Lusthaus et al., 1999):

1. Does the organization have a strategic plan?
2. To what extent is the plan known and accepted by staff in the organization?
3. To what extent is the strategy used for decision-making?
4. Are the roles within the organization clear and understood by staff and partners?
5. Is decision making sufficiently decentralized to promote productivity and good morale?

A staff survey could have been used, or could be used in the future, to pose these types of questions to staff and managers (see Miller, 1991 or Lusthaus et al., 1999 for examples of staff surveys).

The review of archives at IPGRI was hampered by the presence of incomplete records that could not easily be searched. For example, a “letter of agreement” database exists, but it does not house all records from the regional offices and it is not maintained in a format that facilitates searching across years. Other problems were found with records of publications and travel. A search was conducted of the records that could be accessed given the time and resources available.

7. Application of Findings and Conclusions

The participatory self-assessment approach is thought to be a means by which findings and conclusions can be internalized and changes more readily adopted by participating organizations. The approach actively involved a wide variety of staff from the participating organizations over a one-year period. For example, a seminar for all IPGRI professional staff was held on the methodology and models used in the evaluation. This approach increases awareness among a large audience, both inside and outside the participating organizations, as to the methodologies and results of the evaluation. In this way, the evaluation will be immediately put to use as a management advisory and decision-making tool.

The evaluation report was included in a set of documents used by an external review of IPGRI's sub-Saharan Africa regional office in September 2001. Tentative findings were available so that the review team could analyze and build upon this study to develop its own set of conclusions and recommendations.

It has been recommended that the methodologies and results of the evaluation be presented to IPGRI professional staff during a workshop. This would increase awareness and understanding of the process of the evaluation and its results and engage staff in analyzing the conclusions and generating recommendations for the institute. A workshop would increase the likelihood that relevant and useful recommendations would be developed and adopted.

The Director General of CSIR and other interested government officials with authority for PGRC will be briefed by the center Director as to the findings and conclusions of the report. The briefing will raise awareness among these officials as to the methods, findings and conclusions and involve them in establishing recommendations. As a result, there should be greater support for PGRC as it takes action to implement the recommendations.

Follow-up Studies

Interviews with IPGRI staff and GRENEWECA steering committee members included questions aimed at gaining respondents' perspectives on capacity development in the West and Central Africa region. These data were not analyzed for the purposes of this report. However, a report will be prepared to illustrate the findings and conclusions, so that IPGRI and GRENEWECA's capacity development work across the sub-region can be assessed and improved.

The coordinator of IPGRI's sub-regional office for West and Central Africa has expressed an interest in conducting similar evaluations in other West and Central African countries. If the necessary resources can be identified, these studies might be carried out to increase understanding of the experiences of capacity development in different country contexts.

Annexes

Annex 1. Key Concepts

Capacity Development: The process by which people, groups and organizations create and strengthen their capabilities to perform over time as perceived by their stakeholders and/or beneficiaries/clients (Morgan, 2001).

Organizational Performance: Organizational performance is a function of the interplay between an organization's unique motivation, its organizational capacity and forces in the external environment. It may be conceived as falling within three broad areas: (i) effectiveness—performance in activities that support its mission, (ii) efficiency—performance in relation to resources available and (iii) ongoing relevance—performance in relation to long-term viability or sustainability (Lusthaus et al., 1995).

Organizational Motivation: Every organization has a unique working environment in which employees are driven by a wide range of motivation. Some may be highly motivated by the general interest in “doing good work” while others may be driven by the ambitions or motives of their superiors or other key players in the organization. Financial- or career-based incentives may also influence an employee's attitude and outlook for work. Lusthaus et al. (1995) discusses motivation in terms of how an organization expresses its purpose and history and how employee personalities resonate with this expression.

Organizational Capacity: An organization's ability to carry out its functions and achieve desired results over time. Lusthaus et al. (1995) frames organizational capacity in terms of six main, interrelated areas that underlie an organization's performance: (i) strategic leadership (including governance and structure of the organization), (ii) human resources, (iii) other core resources (including infrastructure and technology), (iv) program management, (v) process management (i.e. problem-solving, communication and monitoring and evaluation) and (vi) inter-organizational linkages.

External Environment: Forces outside the organization that can either facilitate or inhibit organizational performance. These influences may fall under the general categories of administrative/legal, technological, political, economic, social or cultural and stakeholders' interests (Lusthaus et al., 1995).

Plant Genetic Resources: Plant genes are the basic molecular-level elements that control the transmission of hereditary characteristics of a plant, such as seed or fruit production, disease resistance, reproductive capacity and resistance to environmental stresses (Woolf, 1977). Plant genetic resources are those plant genetic materials that have value for present and future generations of people (IPGRI 1998b). Plant genetic resources have a variety of important uses. For example, farmers and plant breeders use them to develop new varieties of existing crops or to develop new crops. Farmers can use plant genetic resources to develop crop varieties that are more resistant to drought conditions. Plant breeders use plant genetic resources to develop disease resistant varieties. The introduction of new crops can increase income, bring in new germplasm materials, increase crop yields and enhance nutrition.

Theory of Action: Describing the eventual outcome sought, and establishing the linkages between small actions and larger goals is an important step in evaluation because it provides an understanding of what outcomes can be expected. It is against this expectation that progress can be evaluated. Other terminology used to describe a theory of action includes impact pathway, impact chain and theory-based evaluation (Patton, 1997; Mayne, 1999; Stufflebeam, 2001).

Indicators: Indicators show or imply the extent to which established objectives have or have not been met. One school of thought suggests that indicators should define in measurable detail the necessary

and sufficient performance levels required in order to meet the objectives (Center for Rural Development and Training, 1997). This perspective also promotes the idea that indicators should be described in terms of the quantity of work, the quality standards desired and the timeframes in which the activity will be completed, and that such indicators should be used as benchmarks against which projects are evaluated. Another school of thought argues that analysts should be prepared to accept that there are limits to the extent to which indicators are useful tools against which to measure complex processes such as capacity development (Lusthaus and Morgan, 2000). This paper attempts to test a set of draft indicators that have been developed for plant genetic resources programs (FAO, 2001).

Annex 2. Methodology used in the Evaluation

Data collection

Using multiple sources of evidence is one means of improving the credibility of case study research and qualitative analysis (Yin, 1994). In this case, several methods were used to collect evidence from various sources:

Organizational self-assessment workshop: The self-assessment workshop is a kind of focus group used to convene members of the organizations involved and their stakeholders to discuss organizational capacity issues related to key research questions (Horton et al., 2000). Four self-assessment workshops were held in this evaluation, one for PGRC staff who had been employed for over ten years, one for PGRC staff who were more recently hired by the institute, one for PGRC stakeholders, and one for GRENEWECA steering committee members. A fifth workshop was originally planned for IPGRI staff members actively involved in managing capacity development projects or activities in West and Central Africa, but this was abandoned due to cost factors associated with convening staff from headquarters and various regional and sub-regional offices.

Organizational self-assessment survey: The self-assessment survey was used to survey key IPGRI staff members involved in organizational capacity development. The purpose of the survey was to assess the extent of IPGRI's efforts to build capacity in Ghana and West and Central Africa, obstacles to success of the programs, factors contributing to success and ways to improve in the future.

Key contact interviews: Two groups were interviewed. In Ghana, interviews were held with the Deputy Directors-General of the CSIR in charge of the Agriculture, Fisheries and Forestry and the Environment and Health Sectors, and the Director of the CRI. In addition, key IPGRI managers were interviewed to gain their perspectives on capacity development within West and Central Africa. Managers interviewed included the Assistant Director General, the Group Director for the Documentation, Information and Training Group, the Group Director for the Genetic Resources, Science and Technology Group, the Coordinator of the System-Wide Genetic Resources Program and the Director for INIBAP. The Director of the regional office for sub-Saharan Africa was not interviewed, since he had only recently been hired by IPGRI. The interviews were later transcribed for analysis.

PGRC Director personal history: The PGRC Director was interviewed in order to capture his perspective on his organization, his personal development as a scientist and manager and the factors and influences that either helped or hindered him in his career progression. The interview was transcribed and analyzed as a source of evidence for the case study.

Review of archival records and organizational documents: Archival records and documents from all three participating organizations were reviewed. A number of relevant documents from each organization or from other related organizations were identified and reviewed for evidence relating to the study. Archival records, such as budget, accession records, letters of agreement and germplasm distribution records were reviewed and quantitative data gathered and analyzed. The study involved the compilation of data on changes in the number of staff, the highest qualification attained by staff, training of staff and sponsors of the training, inventory of assets, publication by staff, germplasm collection and distribution, sale of produce and budget analysis from 1994 to 1999. IPGRI archival records reviewed were primarily organizational databases including the letters of agreement database, the travel report database and the training database. Annual project reports were also reviewed, as were in depth review documents of the Sub-Saharan Africa program and the Documentation, Information and Training Group and the four reports of the external program and management reviews of the institute that have taken place over the past 20 years.

Engaging management to promote use of evaluation results: Before starting any activity, and indeed before undertaking the evaluation on any level, team members carefully involved various responsible officials within the participating organizations. The aim was to ensure that each

organization was prepared to undertake a critical analysis of its work, to share the results with a larger group and to help build awareness of the evaluation process. This kind of approach is necessary in order to gain approvals needed to proceed, and also increases the likelihood that the results of the evaluation will be used to improve similar capacity development programs in the future (Patton 1997).

Methods used to analyze, synthesize and interpret the results

The results were analyzed on a number of levels that relate directly to the expected impacts and theory of action. First, results were grouped into those that relate to performance and change at PGRC over time and those that relate to contributions of the Ghana Government, IPGRI and GRENEWECA. Results were then grouped according to the three areas that contribute to performance: external environment, motivation and capacity, and by the PGRC priority areas within each of the three. Within these areas, findings were grouped by activities undertaken, strengths, weaknesses, and future projections and needs. Interviews were transcribed into electronic documents. Due to the volume of data, findings from the IPGRI interviews and questionnaires were loaded into Excel databases for analysis. Data from the PGRC and GRENEWECA self-assessment workshops were stored as simple electronic documents. Conclusions were drawn by triangulating evidence from the various methods and sources to find where experiences converged and common themes emerged.

Division of responsibilities and tasks within the evaluation team

The evaluation team consisted of Dr. Samuel Bennett-Lartey, Director of PGRC, Dr. Raymond Vodouhe, GRENEWECA Coordinator and Ms. Jamie Watts, Evaluation Specialist at IPGRI. In general terms, responsibilities were divided between the team members so that each had primary responsibility for the components most closely associated with their own organization. Dr. Douglas Horton, Ms. Gerdien Meijerink and other ISNAR staff provided critical support in terms of technical assistance with the design of the self-assessment workshops and questionnaire.

An objective of the evaluation was to build evaluation capacity among the team members by learning from each other and from technical experts involved in the project. This is illustrated in the way that the self-assessment workshops were designed and carried out. The first self-assessment workshop was conducted with GRENEWECA steering committee members. Bennett-Lartey and Vodouhe were members of the steering committee so participated as respondents. The workshop was designed with inputs from all team members and with assistance from ISNAR staff who had previous experience designing and carrying out similar workshops in Latin America. Watts facilitated the workshop. The next workshops at PGRC were designed with inputs from the team and ISNAR, and held immediately after the GRENEWECA workshop, in order to build on lessons learned and to adapt the methods for use in the PGRC context. The workshops at PGRC were facilitated by Vodouhe, who had learned how to conduct the workshops from his own experience as a participant in the earlier workshop. Throughout the evaluation, technical assistance was provided by team members and by ISNAR.

Annex 3. Activity Areas and Indicators for Monitoring the Implementation of the Global Plan of Action

Completed, on-going and proposed programs/projects addressing priority activity areas of the *Global Plan of Action*.

In Situ Conservation and Development

Activity Area 1. Surveying and Inventorying Plant Genetic Resources for Food and Agriculture

- Surveys/inventories of plant genetic resources for food and agriculture carried out.
- Threatened species, relevant to food and agriculture, identified.
- Priority areas to survey/inventory identified.
- Surveying/inventorying activities integrated within the national strategy and policy on PGRFA conservation and use.
- Methodologies developed for surveying and inventorying intra- and inter-specific diversity in agro-ecological systems.
- Geographic information systems to support genetic resources surveys used.
- Training and capacity building in taxonomy, population biology, ethnobotany, and ecoregional or agroecological surveying carried out.

Activity Area 2. Supporting On-farm Management and Improvement of Plant Genetic Resources for Food and Agriculture

- Farmers and local farmer communities, national genebanks and research institutes involved in PGRFA on-farm management and improvement programs/projects.
- Socio-cultural factors incorporated into design and implementation of agricultural research and plant genetic resources activities.
- Incentives and policies to facilitate and encourage on-farm management and improvement of PGRFA in place.
- Support to community-based institutions for on-farm management.
- Multidisciplinary scientific research carried out in ethnobotany and socioeconomics of plant genetic resources, population and conservation biology, crop improvement, little known crops.
- Interdisciplinary training carried out in facilitating, improving and catalyzing on-farm plant genetic resources activities.

Activity Area 3. Assisting Farmers in Disaster Situations to Restore Agricultural Systems

Existence and/or implementation of:

- Plan(s) for assisting farmers in disaster situations to recover/restore adapted local varieties.
- Information systems to identify appropriate germplasm for re-introduction, after disasters.
- Mechanisms to facilitate rapid acquisition, multiplication, restoration and provision of materials, within the country, and from/to other countries.

Activity Area 4. Promoting *In Situ* Conservation of Wild Crop Relatives and Wild Plants for Food Production

- Strategies for *in situ* conservation and use of wild crop relatives and species gathered for food developed and implemented.
- Wild food plants and wild relatives of crop plants identified for conservation *in situ*.
- Measures taken to support local communities in sustainable management of relevant wild plants.
- Wild crop relatives included in protected area plans.
- Wild crop relatives included in biodiversity action plans.
- New protected areas designed for the conservation of wild crop relatives.

Ex Situ Conservation

Activity Area 5. Sustaining Existing *Ex Situ* Collections

- Budget, staff, number of species and accessions of *ex situ* holding collection.
- Agreements to facilitate/secure storage in other countries implemented.
- Training in genebank management carried out.

Activity Area 6. Regenerating Threatened *Ex Situ* Accessions

- Regeneration plan for priority species developed and implemented.
- Number of accessions regenerated according to agreed international standards.
- Training and research to improve effectiveness and efficiency of regeneration carried out.
- Research in genetic diversity changes during regeneration carried out.

Activity Area 7. Supporting Planned and Targeted Collecting of Plant Genetic Resources for Food and Agriculture

- Number of accessions collected.
- Number of accessions for which long-term conservation has been secured.
- Training in germplasm collecting methodologies and practices carried out.

Activity Area 8. Expanding *Ex Situ* Conservation Activities

- Number of institutions involved in *ex situ* conservation.
- Low-cost botanic gardens, arboreta and field genebanks established in universities, schools, *etc.*
- Innovative management strategies and/or improved methodologies for *ex situ* conservation of vegetatively propagated and recalcitrant seeded plants, as well as for species neglected in current conservation activities, developed and published.
- Training organized in innovative management strategies and/or improved methodologies for *ex situ* conservation of vegetatively propagated and recalcitrant seeded plants, as well as for species neglected in current conservation activities.
- PGRFA storage facilities upgraded.

Activity Area 9. Expanding the Characterization, Evaluation and Number of Core Collections to Facilitate Use

- Number of accessions characterized and evaluated.
- Number of institutions involved in PGRFA characterization and evaluation.
- Training in characterization and evaluation carried out for national program staff, and on-farm evaluation for farmers.
- Number of core collections identified.

Activity Area 10. Increasing Genetic Enhancement and Base-broadening Efforts

- Genetic enhancement and base-broadening needs and opportunities identified.
- Genetic enhancement and pre-breeding programs established.

Activity Area 11. Promoting Sustainable Agriculture through Diversification of Crop Production and Broader Diversity in Crops

- Programs of genetic uniformity monitoring and/or vulnerability assessment established.

- Measures taken to increase the use of mixtures and/or a range of varieties.

Activity Area 12. Promoting Development and Commercialization of Under-utilized Crops and Species

- Under-utilized species with potential for broader utilization identified.
- Sustainable management practices for under-utilized species developed and implemented.
- Post-harvest processing and marketing methods for under-utilized species developed.
- Training of farmers, scientists, extension workers carried out.
- Planting material of selected under-utilized crops and species available for use.

Activity Area 13. Supporting Seed Production and Distribution

- Number of crop varieties released.
- National seed policies to develop and expand viable local-level seed production and distribution mechanisms for varieties and crops important to small-scale farmers implemented.
- Incentives for quality seed production of under-utilized crops provided.
- Farmer organizations supported.

Activity Area 14. Developing New Markets for Local Varieties and “Diversity-rich” Products

- Range of local crop varieties available in the market increased.
- Markets for local varieties and “diversity-rich” products developed or expanded.

Institutions and Capacity-building

Activity Area 15. Building Strong National Programs

- National committee or equivalent entity responsible for the coordination of PGRFA conservation and use at national level established or strengthened.
- Farmers, plant breeders, private sector, NGOs and Universities involved in the national committee or program.
- National Strategy, Plan or Program on Conservation and Sustainable Use of PGRFA addressing GPA's priority activity areas established/strengthened and mechanism for evaluation and updating in place.
- Priority objectives established within the National Strategy/Plan/Program on Conservation and Sustainable Use of PGRFA in relation to the GPA's priority activity areas.
- National Focal Point(s) for the implementation of the GPA appointed.
- Periodicity of National workshop(s) on conservation and use of PGRFA.
- Coordination of crop, forest and animal genetic resource programs.
- National policy and legislation for biodiversity and genetic resources for food and agriculture developed and adopted.
- Ratification of international agreements related to PGRFA.

Activity Area 16. Promoting Networks for Plant Genetic Resources for Food and Agriculture

- Level of involvement of the country in existing networks (i.e. participation and financial support)
- Network-related projects implemented.
- Publications developed in the context of network activities.

Activity Area 17. Constructing Comprehensive Information Systems for Plant Genetic Resources for Food and Agriculture

- Status of development and use of national/institutional *in situ* and *ex situ* PGRFA and seed stocks information systems.
- International information systems accessed.
- Training in documentation methodologies and information management carried out.

Activity Area 18. Developing Monitoring and Early Warning Systems for Loss of Plant Genetic Resources for Food and Agriculture

- Measures taken for continuing assessment of genetic erosion and its consequences.
- Number of persons trained in gathering and interpreting information on diversity and threats.
- National Focal Point(s) for gathering and reporting information on threats to genetic erosion appointed.

Activity Area 19. Expanding and Improving Education and Training

- Number of national program personnel and others trained.
- Participation in national, regional and/or international training courses.
- Existence of educational programs incorporating plant genetic resources aspects.
- Educational and training strategy in line with GPA's priority activity areas established or re-oriented.

Activity Area 20. Promoting Public Awareness of the Value of Plant Genetic Resources for Food and Agriculture Conservation and Use

- Number and kind of measures taken to promote awareness among priority target groups.
- Public awareness products produced.

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