منظمة الأغذية والزراعة للأمم المتحدة
联合国粮食及农业组织
Food and Agriculture Organization of the United Nations
Organisation des Nations Unies pour l'alimentation et l'agriculture
Organización de las Naciones Unidas para la Agricultura y la Alimentación
E

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

AN ANALYSIS OF EFFECTIVENESS IN PLANT GENETIC RESOURCES NETWORKS

By Bert Visser and Hans Smolders

Centre for Genetic Resources, the Netherlands,
Wageningen University and Research

Contents

EXECUTIVE SUMMARY

Background

Since 1991, the Commission on Genetic Resources for Food and Agriculture (CGRFA) has considered the role of networks as a significant element of the Global System for the Conservation and Utilization of Plant Genetic Resources. This is reflected in Priority Activity 16 of the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (GPA), and in Article 16 of the International Treaty on Plant Genetic Resources for Food and Agriculture, which has entered into force at June 29, 2004.

In preparation for the Ninth Regular Session of the CGRFA in 2002, a background study was commissioned by FAO to provide an overview of networks currently contributing to the conservation and sustainable use of plant genetic resources for food and agriculture (PGRFA). An inventory was compiled of the networks which contribute to the implementation of the GPA and to the realization of the objectives of the International Treaty.

Following the recommendation of the second Intergovernmental Technical Working Group on PGRFA, FAO has commissioned a new report 'identifying, analyzing and show-casing successful networks world-wide, on plant genetic resources'.

This report intends to enhance the understanding of the characteristics of successful networks, and to encourage greater collaboration amongst them, based on a set of case studies of successful networks identified through a number of rigorous selected criteria.

Identified potential success factors

Plant genetic resources represent an actual or potential use value and an economic asset. The recognition of the value of plant genetic resources by policy makers has resulted in various policy arrangements at the national, regional and global level that strongly and increasingly impact on the functioning of networks. As a consequence, from technical organisations, plant genetic resources networks rapidly develop into organisations with a dual nature, facilitating collaboration at the technical level and creating the policy conditions for technical exchange.
The following potential success factors have been used to analyse existing plant genetic resources networks and to select successful examples.

- Objectives (scope, level of ambition)
- Type of activities (in line with objectives, result of priority setting)
- Outputs (type of outputs, in line with planning)
- Training (capacity building, contribution to network functioning)
- Internal organization (steering committee, secretariat, umbrella organization)
- Sources of funding (internal, external, development over time, fundraising capacity)
- Ownership of network (management decisions, partner influence)
- Internal resources/inputs in kind (partner commitment, balance with external support)
- Internal communication (level, subject matter, tools)
- Impact beyond objectives (relevance beyond own constituency)

Short description of selected networks

Four categories of PGR networks were assessed to select networks for case studies, i.e. regional PGR networks, crop-specific networks, thematic networks and *in situ* oriented networks. Existing networks potentially qualifying for the case studies were identified.

- ECP/GR, European Cooperative Programme for Crop Genetic Resources Networks
- SPGRC, SADC Plant Genetic Resources Centre network
- SABONET, Southern African Botanical Gardens Network

- CATCN-PGR, Central Asian and Transcaucasian Network on Plant Genetic Resources
- COGENT, International Coconut Genetic Resources Network
- INGER, International Network for Genetic Evaluation of Rice
- LAMP, Latin American Maize Project.
- SAVERNET, South Asia Vegetable Research Network – II
- SINGER, System-wide Information Network for Genetic Resources
- EURISCO, European Internet Search Catalogue network
- UPWARD, Users' Perspectives With Agricultural Research and Development network
- CBDC, Community Biodiversity Development and Conservation network.

Success factors in their context

The objectives of conservation and utilization of plant genetic resources and sharing the benefits thereof can only be reached effectively through multilateral collaboration. It is the subject matter (genetic resources and the accompanying information, scattered as these are over many countries and stakeholders) that renders the multilateral network an almost unavoidable and essential instrument to attain the objectives.

This report made an attempt to distil from the acquired information which factors determine the successfulness of a network. Naturally, these factors do not operate independently from each other, but feed into or otherwise influence other factors.

For partners to effectively collaborate in the framework of a network, *clear objectives* need to be set. Formulation of the objectives is certainly important at the start of a network, but objectives once set also need regular revisiting to be able to adjust to changing needs. A needs assessment should lie at the basis of the process of formulating or revisiting the objectives. The process of formulating the objectives contributes to team working and consensus building in an early stage of network formation.

In addition, sufficient human and financial resources should become available. Such resources can be generated by *external funding* from other parties than the partners in the network, by *financial contributions* from the partners, and by access to human resources made available by the partners as *inputs in-kind*.

Network outputs may be various but should have obvious value for the network partners. Outputs may concern the seeds (or plants) and include regeneration, characterisation, evaluation, reintroduction and other use of genetic resources of common interest to the network, but may also concern improvement of genebank management or on-farm management practices, the establishment of common databases, and further research and training. Network outputs function as a major pull factor to potential new partners and active individuals. The more obvious the benefits to the partners in the network are, the more likely it is that inputs in-kind and/or financial contributions from the partners for network activities will become available. Whether network activities are geared optimally to obtaining direct benefits for the partners depends on clear objectives as a basis as well as on a transparent and regular *priority setting process* in the network in which all partners can equally participate. An effective priority setting mechanism results in partner inputs and in a *sense of ownership* on the network activities and outcomes.

The better network objectives and results fit into the global priorities formulated in the FAO Global Plan of Action on PGRFA and the shared objectives of the Convention on Biological Diversity and the International Treaty on PGRFA, the easier it is to obtain *political backing* and external financial support from bilateral and international donor organisations.

On fundraising capacity

From network experiences it is clear that the success and sustainability of the network is highly dependent on the continuous availability of sufficient resources, and that being an effective network in a technical sense does not automatically result in political recognition and external funding, and the latter should not be taken for granted. *Fundraising* appears to be an essential activity and needs continuous attention, not just at the start of network operations, or near the end of a project phase, but continuously, and not only for a given set of minimum activities but also to expand the number and level of network activities. Active and well-planned lobbying forms a central element of fundraising, and training to increase the fundraising skills of network individuals is an investment that pays back. When fundraising, one should explain the impact of plant genetic resources network outputs on conservation of biodiversity as well as on community development and breeding programmes, where appropriate, depending on the type of activities for which funding is sought. Therefore, a proper mix of technical managers and more socially oriented active network individuals is a great benefit. Closely linked to fundraising is the issue of visibility of the network. In particular donor funding, but also funding from national governments is hard to obtain if the activities and benefits of the network are not well publicised. A well-organised and updated web site and brochures presenting the network and its outputs to potential funding agencies should receive the necessary attention.

On network management and leadership

In overseeing the priority setting process, in organising work and facilitating the production and distribution of results, and in reporting to funding agencies and partners, the *network management* (usually a *secretariat* and/or a *steering committee*) plays an essential role.

All successful networks have a functional steering committee. The steering committee should provide guidance and legitimacy to the network operations and is accountable to donors and partners on the network operations. The steering committee should have members from the partner organisations with knowledge on genetic resources, strategic capabilities, and with sufficient time to devote to the network, and members should be functioning in sufficiently influential positions in their home country to generate political support for network operations from within their country. Networks may establish technical committees or other discussion platforms in addition to formalised steering committees to meet both technical and policy demands in the network.

Leadership appeared of major importance in the functioning of the analysed networks, but the type of leadership varied. In some cases leadership was mainly based on the personal capacities of a coordinator, whereas in other cases this derived from the dominant but accepted role of a partner institute or umbrella organisation.

The secretariat may profit from an *umbrella organisation* that provides services to the network, but this is not an absolute prerequisite for an effective functioning of the network. If necessary one of the partner organisations can fulfil this role. The umbrella organisation may provide vertical integration in other networks and global platforms, such as for agricultural research or community development, so that the network operations effectively contribute to reaching objectives at a higher integration level. Finally, efficient *internal communications* may help the functioning of the network, but the case studies provided do not support the conclusion that frequent e-mail exchanges are correlated with the success of a network. By contrast, frequent face-to-face meetings are widely regarded essential.

On network-to-network interactions

In addition to partnerships with host organisations, synergistic network-to-network partnerships can be both beneficial and cost-efficient. Such partnership may contribute to critical exchange of expertise and technical and management experience, and avoid unnecessary duplication of research programmes, germplasm conservation and information management. Examples of good network-to-network partnerships are the cooperation between SINGER and ECP/GR assisting the EURISCO

network in building and hosting the European germplasm database. Other examples are partnership activities between ECP/GR, GRENEWECA and EAPGREN on capacity building in the areas of policies and informatics.

For IPGRI as host institution, ECP/GR was a major example to promote regional collaboration in genetic resources in other regions. ECP/GR also set the stage for EUFORGEN, the European Network on Forest Genetic Resources, and played a key role in establishing the EU programme on genetic resources that contained openings for participation from non-member countries of Eastern Europe. The experience of the CBDC programme resulted in the development of new networks active in the area of on-farm management of genetic resources (i.e. BUCAP and PEDIGREA) that could benefit from the (positive and negative) experiences of CBDC. Likewise, the experiences of the CBDC programme are shared with other partners in the context of the Fund for Sustainable Biodiversity Management (e.g. IFOAM, Pesticide Action Network, GRAIN, etc.).

Lessons learnt from ECP/GR also influenced the work of other CGIAR-facilitated networks, amongst these COGENT. The Swiss Agency for Development Cooperation used lessons learned from ECP/GR to apply them to other SDC-funded networks in East Asia and the Himalayas. Also, there are many examples of network spin-offs using the protocols and experience of one network to continue or build new networks. For example, GEM and LAMN-PGR have build on the existing network collaboration and experience in the preceding LAMP network.

Finally, network-to-network effects also develop because some network members are also members of other PGR networks, and serve as obvious information exchange channels. Such crosslinks exist in particular between regional networks and crop networks.

A proposal for indicators

Success factors determining the effectiveness of plant genetic resources networks can only be partially deduced from experiences in and analysis of network functioning in general (generic success factors), and are also heavily influenced by the subject matter, and the policy environment in which plant genetic resources networks function (specific success factors).

From the case studies a number of success factors could be extracted, and their mutual relationships have been analysed, in order to select a few major success factors. Major success factors have been translated into measurable indicators, in particular for purposes of internal network planning and evaluation and for the setting of network targets.

The following major indicators are proposed:

- Available funding

Funding includes both funding from partner organisations or member countries in the form of membership fees, funding for joint network projects, etc., and external (donor) funding for network operations, whether specified or not. Available funding is a measure for the political support, and the success of the steering committee, the network coordinator, and the number of active individuals in the network. Political support in turn, is a measure, amongst others, for the clarity and the appropriateness of the objectives.

- Inputs in-kind provided

Inputs include staff time made available for the functioning of the network as well as the provision of facilities to the network, including laboratory facilities, computer hardware and software for common databases, and meeting and housing facilities for workshops. The level and quality of inputs in-kind is a measure for the sense of ownership in the network, and more directly, the benefits that partners derive from network outputs, but also for the political support that allows for such inputs in-kind.

- Number of active partner organisations and active individuals

These indicators provide insight in the robustness of the network, and the balance between partners in the network.

- Number, type and quality of joint outputs.

Whereas the number of independent network activities forms an indication for the viability of the network, the type and quality of the network outputs form a major indication for the network effectiveness.

CHAPTER 1: INTRODUCTION

1.1 Rationale

Since 1991, the Commission on Genetic Resources for Food and Agriculture has considered the role of networks as a significant element of the Global System for the Conservation and Utilization of Plant Genetic Resources. This is reflected in Priority Activity 16 of the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (GPA) and in Article 16 of the recently adopted International Treaty on Plant Genetic Resources for Food and Agriculture, which has entered into force at June 29, 2004. Networks for plant genetic resources are promoted and encouraged or developed by both the GPA and the International Treaty.

In preparation for the Commission's Ninth Regular Session in 2002, a background study was commissioned by FAO to provide an overview of networks currently contributing to the conservation and sustainable use of plant genetic resources for food and agriculture (PGRFA). An inventory was compiled of the networks which contribute to the implementation of the GPA and the objectives of the International Treaty, based on information drawn from a number of sources, in particular information available on the internet.

The Commission encouraged countries to provide information on the networks in which they participate, and agreed that the effectiveness of networks should be assessed, and that synergy between networks should be promoted.

In order to address these recommendations, FAO has initiated a process including two complementary activities. Over 200 networks coordinators have been invited to update information in the inventory of networks referred to above, as well as to complete a self-assessment questionnaire aiming at analyzing network efficiency and effectiveness, and to share this information with the Secretariat of the Commission.

In addition to these activities, and following the recommendation of the second Intergovernmental Technical Working Group on PGRFA, FAO has commissioned a new report 'identifying, analyzing and show-casing successful networks world-wide, on plant genetic resources, as well as a condensed version of the same' and a review of the above mentioned self-assessment questionnaire. This report is to be made available tot the Commission at its Regular Session in November 2004.

1.2 Objectives of the study

The report should serve to advance the understanding of the characteristics of successful networks, and to encourage greater collaboration amongst them, through a set of case studies of successful networks identified through a set of rigorous selected criteria.

In addition, the report should provide a self-assessment instrument as a stand-alone tool by revisiting the existing self-assessment questionnaire, earlier developed by FAO in collaboration with the International Plant Genetic Resources Institute (IPGRI).

1.3 Contents of this report

This report consists, in addition to this short introduction, of five chapters.

Chapter 2 details the study approach. It discusses the classification of networks used in the earlier Background Study for the purpose of this follow-up study; it revisits some vital characteristics of network functioning, and reviews and selects criteria to assess successful networks in a first analysis. It continues with an elaboration of the criteria and potential deliverables that have subsequently been used to analyze networks. It then presents the networks selected for further study, based on the criteria, and groups them into a matrix depicting the selected networks by type and region. Finally, the

approach taken for the development of the case studies and communication with selected networks and their stakeholders is presented.

Chapter 3 analyses the provided information on the selected networks, stemming from documents as well as interviews with and responses to questionnaires from a substantial number of network participants and stakeholders, according to a grouping of criteria, including the degree to which the network is closed or open,, the funding mechanisms, the network benefits and outputs, and the network communications. In this context, it also establishes to which extent the pre-conceived success factors appeared to be useful in the actual analysis. It also briefly discusses factors that act as network accelerators and network inhibitors, as well as synergies between networks.

Chapter 4 forms an attempt to interpret the analysis of chapter 4 in more general terms, it provides a coherent context for the individual success factors into a PGR network functioning model, and discusses indicators that can be deduced form the identified and studied success factors.

Finally, chapter 5 presents an adapted version of the self-assessment, developed earlier by FAO in collaboration with IPGRI, to render it a self-standing tool for self-assessment by networks, making as full use as possible of the conclusions of chapter 5. As such, this self-assessment tool should serve as a very practical output of this study.

Several annexes offer additional background information.

CHAPTER 2: STUDY APPROACH

2.1 Re-assessment of the classification of networks

On subject matter

The earlier Background Study entitled 'A Summary and Analysis of Existing International Plant Genetic Resources Networks'[1] recognized five categories of networks, i.e. regional fora, regional PGR networks, crop-specific networks, thematic networks and *in situ* oriented networks. Of these five categories of networks, the latter four focus on genetic resources and/or agrobiodiversity, but the category of regional fora covers networks with a much wider scope, often agricultural research in general. In the previous study this category was included because of its major impact on the networking in plant genetic resources in general. This in turn made it an essential element of the analysis in order to better understand the functioning of networking in plant genetic resources. Since the aim of the current study was to analyze critical success factors for plant genetic resources networks proper, the category of regional fora was not included in the selection of successful case studies. Since the institutional environment of the assessed networks formed criteria in the selection process, the existing and functioning of this category of regional fora still played an indirect role, but did not in itself form an object of study.

In conclusion, four categories of PGR networks were assessed for qualification for case studies, i.e. regional PGR networks, crop-specific networks, thematic networks and *in situ* oriented networks. Seed networks were regarded as part of the category of *in situ* oriented networks, since seed networks have as one of its objectives to maintain, develop or restore genetic diversity in farmers' fields.

On closed and open networks

Networks can also be classified according to the degree in which membership is open and flexible or not.

Open networks are almost by definition scale-free, which means that the membership fluctuates depending on the expected benefits perceived by the members. Those who feel attracted to the network will connect, while those who have connected and feel that the social, ideological or physical needs cannot be satisfied will disconnect; as a result the turnover of membership in open networks is usually fairly high. The purpose of many open networks is to attract as many members or "customers" as possible with similar needs and wants. If successful, open networks can attract hundreds and sometimes thousands of members, but may loose them as soon as the network "product" or content is not renewed and looses its attractiveness.

The laws that govern open networks and determine the member-to member interactions are not necessarily random, but have proven to answer to so-called Power Law Distributions (Barabasi, 2003). Among the members are people or organisations that are highly interconnected and active, while others are less connected and most are hardly if at all connected in the network. The highly linked interactive members are the hubs or drivers and singly or together determine most of the network activity, providing leadership and direction to the network. A network secretariat or the coordinator can be a hub, but he/she is not necessarily the only one as there can be many other hubs in the network, either as individuals or organizations, usually those who take part in Steering Committees and Working Groups. Evidently, robustness of the network is correlated with the number of hubs and drivers. If one hub is removed or disconnected, the network continues to function without any problem. If the network depends on a single hub, the network will disintegrate soon after such person or organization stops functioning.

[1] FAO Background Study Paper No. 16, see FAO web site ftp://ext-ftp.fao.org/ag/cgrfa/BSP/bsp16e.pdf

By contrast, closed networks have a stable membership and have formal ways of regulating membership functions. Membership in this type of networks is regulated through signed agreements, MoUs and/or protocols. Members have been carefully selected to warrant commitment and active participation and long-lasting contribution to resourcefully realize the network objectives. From the start, there is a sense of cultural and ideological unity. Because of the limited membership, such networks function more like ordinary institutions, and answer to laws that govern such organizations, although the structure can be complex and members geographically spread around the globe. The distinction between open and closed networks is not absolute. For example, hubs and drivers may be almost equally relevant for the functioning of both open and closed networks.

On growth phases

The perception that the organisational structure of a network is not static but evolves over time has formed the basis for a number of network studies (Watts, 2002; Greiner, 1972, 1998; Biggs 1989; CGIAR, 1999; Plucknet *et al*., 1993). These studies pre-conceive that network organisations, similar to corporate organisations, evolve through time, may grow in size and show growing complexity in their decision-making processes. According to the classic model introduced by Greiner (1972, 1998), organisations or networks often start as an informal group of people brought together by a common interest, and later go through different phases of centralisation, delegation, co-ordination and collaboration. Each of the evolutionary phases of the network is triggered by periods of management inadequacies and crisis within the organisation, forcing significant changes in management structures which in turn lead to a new phase and growth.

Using Greiner's evolutional model, Watts (2002) selected four networks on plant genetic resources for a study on organisational structure, believed to represent different organizational development stages. The selection included a young informal network (The Lusophone Initiative, phase 1), the Forest Seed Research Initiative as a representative of a centralised organisational structure (phase 2), COGENT as an example of decentralised organisational structure (phase 3-4), and ECP/GR that works through line staff and crop-based or thematic sub-networks as a network representing a decentralised network (phase 4-5). The study is a well laid-out analysis of participatory development in plant genetic resources networks. With respect to this model, Kalaugher & Visser (2002) indicated that care must be taken not to interpret any classification as a model in which phases rigidly follow each other, as networks may have reasons to develop in either direction, or remain in a certain phase at any given time. However, with these considerations in mind it appeared useful to apply the model on the networks analysed in this study.

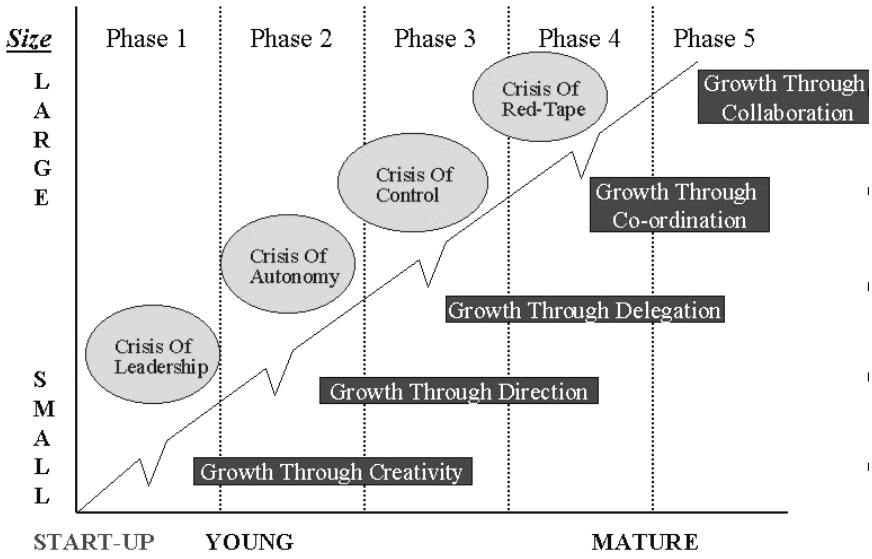

Figure 1. Greiner's Organisational Growth Model

2.2 Review and selection of criteria to assess successful networks

As part of the earlier Background Study, a Proposed Framework for Internal Analysis to Improve the Effectiveness and Efficiency of Networks was provided as Annex 1 to that Study. Based on an assessment of existing scientific literature on the topic, this proposed framework has integrated a number of potential success factors. These potential success factors have been slightly reformulated and grouped in this study in order to focus on the success of plant genetic resources networks in terms of effectiveness and efficiency. Effectiveness is a measure for the net results of the networks regarding conservation and promoting the utilization of plant genetic resources, whereas efficiency is a measure of the cost/benefit ratio, off-setting the experienced benefits or results against the costs to develop and maintain the network

For each success factor a number of potential milestones can be formulated by which the success of a network as measured against a given criteria can be assessed, as presented below in Table 1.

In addition to the success factors identified before, a number of over-arching questions regarding the success of networks have been considered in this study. One of those questions led to an additional potential success factor.

- How is "success" defined? What makes a successful network (does it go beyond outputs and activities and does it deal with impact at a higher level or in different fields)?

This question is only addressed to a limited extent (network-to-network interactions) since a proper analysis would involve much wider investigations, involving impact studies in other fields and at other levels.

Other over-arching questions appeared to be dealt with in the set of existing success factors in an indirect way.

- The question what distinguishes a successful network from a successful project, deals with the objectives of the network as well as the capacity of the network to survive after external funding. This issue has also been dealt with in the previous background Study.
- The question what are the added benefits of networks that justify the extra costs (time, finances, co-ordination, meetings, etc) that often occur with a networking approach, deals with the new criteria on impact, but also with the criteria of objectives, outputs and internal communication.

- The question if there are particular characteristics of genetic resources that require a networking approach (or suggest a greater need for networking than for other technical areas) is related to the question above. In fact it asks whether the extra costs required by the networking approach are particularly warranted in the field of genetic resources, and thus it deals with the criteria of cost/benefit ratios. These questions will be revisited in the analysis and conclusions section at a more generic level.

The following list of potential success factors has been used to analyse existing plant genetic resources networks and to select successful examples.

1. *Objectives*

   Are the scope and the objectives of the network clearly defined and agreed by its members? A founding document or charter might form proof, or alternatively the easily retrieved minutes of a founding meeting. Scope and objectives may also be published through a network web site.

   Have the scope and objectives been respected? Reference can be made to the scope and/or objectives in other network documents, in particular yearly or multi-year work plans, and in decisions on priority setting.

   What has been the contribution of the network to reaching the objectives? Would the objectives also have been (partially) realized, if the network had not existed?

2. *Type of activities*

   The objectives of a network in terms of cooperation might be more ambitious or moderate. More modest objectives might be easier to reach, but their impact will probably be lower as well. In this sense, a hierarchy of activities can be distinguished. Whereas information exchange is a basic network activity, technology transfer requires more active collaboration, but largely unidirectional. Research collaboration requires two or more partners operating at a more equal footing, whereas task sharing supposes even more mutual trust, since options to check and control partners' inputs and approaches are more limited and quality of the work delivered should to some extent be taken for granted. Promoting the exchange of PGRFA stands apart from - and as an activity can be combined with - any of these activities, and might have major impact on the conservation and utilization of germplasm.

3. *Outputs*

   Have the objectives been translated into expected results over given timeframes? Translation into expected results may be a measure for the appropriateness of set objectives.

   How effectively (quantitative and qualitative) results can be measured determines in turn whether an assessment of the network results for the effectiveness in reaching its objectives can be performed.

   Have expected outputs been realized? The answer provides a clue to the degree of feasibility of formulated expected results and the degree to which it appeared possible to reliably predict the activities and effectiveness of the network. Can this be measured from publications or in other ways? A positive answer to this question will increase the quality of the assessment since written statements are likely to require more careful formulation and tangible results can be more objectively measured.

   What types of outputs were realized? If there is a hierarchy in complexity in reaching expected results, are the more easily obtainable results realized or more difficult types as well?

Finally, the quality and volume of the outputs is expected to be correlated to the funding and inputs in-kind available to the network. The cost/outputs ratio forms a direct measure for the efficiency of network operations. In practice, an assessment on the efficiency of a network in terms of costs/outputs may only be possible in comparison with other networks. In addition, differential cost structures in various parts of the world may sometimes explain differences in costs/outputs ratios.

Could similar outputs have been reached in the absence of the network and against lower or higher costs?

4. *Training*

Whereas training forms an activity and results in outputs as other activities, it has a major binding effect, participants in the network being intensely exposed to other partners and training directly benefiting partner organizations in capacity building. Therefore, training has been separated out as specific criteria. The number of trainees might be a very tangible and measurable output of network functioning, whereas the quality of the training is probably more difficult to assess, as well as the degree to which training is directly benefiting the work of the partner from which the trainee originates. Additionally, whether the trained person has remained available for the activities of the network or the partner forms another measure for the success of training.

5. *Organization*

Has a Steering committee or other responsible body been formed? It may be important that a body responsible for the functioning of a network has been appointed although this may be less relevant for more informal networks. If there is a Steering Committee or other responsible body, selection or appointment of candidates may influence the functioning of such body.

What are the qualifications for an effective steering committee (technical vs. political)? In this respect, a body that consists of representatives *ex officio* is likely to address other issues than a body that is chosen from the participating organisations. What are the advantages and disadvantages of a professional secretariat? How does the personal management style of the network co-ordinator affect success? The operational efficiency of the Steering Committee may be substantially increased if a professional secretariat, likely to be located in one of the participating organisations, or other stakeholders, is available. Clearly, such availability will depend on the level of available funding, one of the other criteria. The management relations (style) may also influence the effectiveness and efficiency of network operations. A more centralised network management may avoid lengthy and time-consuming decision-making processes, but ownership on the network activities might be negatively influenced by over-centralisation or heavy dominance of a single partner. What is the role of leadership in effective networking? Leadership may be rooted in formal responsibilities of partners in the network but also be based on informal positions.

An explicit priority setting process although also linked to the success factors objectives and outputs may be a sign for the degree of transparency in network operating. What types of priority setting processes are used by successful networks?

Finally, an important criteria might be whether there is political, organizational, technical or logistic support from an umbrella organization (e.g. a regional organization for agricultural research and breeding), or other stakeholder organization (e.g. a CG centre with relevant crop mandate).

6. *Source of funding*

This major criterion concerns the volume of funding as well as the funding institutions. The volume of funding bears a direct relation to the network objectives and activities. The funding institutions may be donor organizations (several regional networks). Financial contributions might also come directly from network partners. Some issues on network functioning are strongly dependent on its funding structure. The timeframe over which funding has been guaranteed, in connection with the continuity of funding, may form a major prerequisite for efficient network functioning. Moreover, the possibility and often reality of fluctuating financial resources force the networks to be flexible in their operations and organization. In the extreme situation, external funding may entirely stop, and this requires even more drastic adjustments in network operations. How can networks be sustained after the end of donor funding/support?

Connected to funding is the issue of cost/benefit ratio as being discussed above under outputs.

7. *Ownership of network*

The history, in particular on the founding of a network, may explain whether the network evolved as a bottom-up institution, largely driven by the partners of the network, or whether external donors or other stakeholders have a major responsibility for the functioning of a network. This network history may form a measure for the degree of ownership that is felt towards a network by its participants.
An assessment of current management decisions may be more informative on the ownership on the network felt by partners. To what extent are all participants able to influence management decisions of the network?
If the network is responsible for distribution of funding, criteria of ownership may be whether transparent decision-making procedures have been installed and whether decisions are widely accepted as being fair and appropriate. Internal mechanisms for project granting may be part of such procedures.

8. *Internal resources/inputs in kind*

What contributions are made by the membership in successful networks and how is this balanced by external support?

The functioning of the network might be highly influenced by the possibility for the partner organizations to provide inputs in kind. It is likely that such contributions are highly effective since partners will economize on such inputs, these being extracted from their own resources that could be spent for other purposes as well. At the same time, the quality of such contributions also depends on the expertise available to the partner organization and on the fit to the needs of the network. If this fit is imperfect, effectiveness may decrease as a result. Finally, internally funded contributions to the network should complement externally funded activities.

9. *Internal communication*

Group forming is likely to promote the functioning of networks and this may be promoted by regular meetings, if appropriate at various levels in the network. If physical meetings are feasible these can be supported by other means of communication, in particular by electronic means, but in some sectors or regions mainly through hard-copy documents such as periodic newsletters, depending on Internet access. The network may also be more active if internal communication is not controlled by or dependent on the body responsible for the network, but left to individuals who operate within the network.

10. Impact beyond objectives

Networks may have an impact that is not foreseen or not planned, or clearly surpasses reaching the set objectives. It may also involve an impact of relevance outside their own stakeholder groups. Successful networks or their successful activities may be copied elsewhere. Real impact may initially be hidden and may be of a different nature than envisaged. A network promoting on-farm management of genetic resources may have as a major impact the empowerment of local communities, starting with a biological objective and resulting in a social impact. A thematic network on information sharing may influence policies on collaboration at a more general level. Whereas an analysis on such impact runs the risk of being highly subjective, the impact searched for might be of major importance, since it might regard a much wider circle of stakeholders.

For each of these success factors, a potential set of deliverables can be derived, by which the effectiveness and the efficiency of a network can be measured. In Table 1, each of the success factors elaborated above is listed in conjunction with possible outcomes. This table has been used to devise a questionnaire (used for structured and semi-structured interviews) that formed a tool to obtain useful information about the networks selected for the case studies.

Table 1. Success factors and potential deliverables to measure success of networks

Success factors	*Potential deliverables(Indicators)*
Objectives	Founding document Web site page Minutes of founding meeting Contracts
Type of activities	Information sharing: documents, e-mail traffic Technology transfer: training, trainees, handbooks and protocols, equipment Research collaboration: joint outputs, staff exchange, exchange of materials Task Sharing: documents, specific and mutually distinct outputs Exchange of PGR: proof for role of network
Outputs	Fit with objectives? In line with planning? In line with activities? Relation with costs Documents recording outputs? Use of outputs by the network?
Training	Number of trainings Number of trainees Number of partners involved Subject of trainings in relation with objectives and scope
Organization	Steering committee – membership Professional secretariat Management style? Leadership? Priority setting? Umbrella organization?
Source of funding	External – volume Internal – volume and in-kind contributions Timeframe Continuity
Ownership of network	Network history Decision-making Network role in internal project granting?
Internal resources	Volume in relation to funding Appropriateness of inputs in-kind Decision-making on inputs in kind
Internal communication	Number of physical meetings at which levels? Volume of electronic exchange Newsletter?

2.3 Review of existing networks for inclusion in case studies

As a next element in developing a strategy for the study, existing networks potentially qualifying for the case studies were identified. To this end the overview of networks described in the FAO Background Paper no. 16, referred to above, was taken as a reference. A first selection was done from the networks discussed in this Background Paper, using information in the Background Paper and experiences and views of a small number of directly involved stakeholders regarding the perceived

successfulness of networks. The consulted stakeholders largely consisted of staff of FAO, IPGRI and other CGIAR institutes, and of NARS and national ministries.

In considering the qualification of networks for inclusion in the study, it was argued that networks should not necessarily have an unlimited life span. Networks may also answer specific needs in specific areas at a given point in time, and also networks that have been discontinued may have been very successful in the past judging from their objectives and their results and impact.

In assessing whether networks might qualify, the class of network a given network belonged to, was also taken into account, to arrive at a balanced distribution of the selected networks over the four types of networks, identified earlier in the previous Background Study and presented below.

2.4 Shortlist of networks and short motivation for their inclusion in the study

Based on the procedure above the following networks were selected.

Regional networks

ECP/GR. European Cooperative Programme for Crop Genetic Resources Networks. This network is long-standing, founded in 1980. It has a membership of 36 countries and has currently entered Phase VII. The Programme, which is entirely financed by the participating countries and is co-ordinated by a secretariat based at IPGRI, operates through ten broadly focused Networks dealing with groups of crops or general themes related to plant genetic resources.
The programme can be characterised as extensive, highly formalised, and self-funding. Interesting features include its management style and the relationships between East-European and West-European partners.

SPGRC. SADC Plant Genetic Resources Centre. The centre was established in 1988 by the SADC Member States as a non-profit inter-governmental institution and is located in Zambia. The two major responsibilities of SPGRC are (1) keeping the SADC base collection, which involves the maintenance of the long term storage facilities, and (2) the efficient co-ordination of PGR activities within the region. The latter responsibility renders the SPGRC the pivot in a regional network.
The programme can be characterised as extensive, formalised and depending on long-term mixed funding. Interesting features include its long-term financial sustainability and the relationships and task-sharing between the centre and the national programmes.

SABONET. A network of botanical gardens in Southern Africa. Its objectives were to develop a strong core of professional botanists, taxonomists, horticulturists and plant diversity specialists within the ten countries of southern Africa, competent to inventory, monitor, evaluate and conserve the botanical diversity of the region. SABONET was a GEF (Global Environment Facility) Project implemented by the United Nations Development Programme (UNDP). South Africa's National Botanical Institute (NBI) was the Executing Agency, responsible for the overall management and administration of the project.

The network can be characterised as research-oriented, formalised, and project-funded. Interesting features involve its funding basis and its current level of activities in relation to available funds, as well as its task-sharing between the co-ordinating centre and the members. Also, it claimed collaboration with NGOs.

CATCN-PGR. Central Asian and Transcaucasian Network on Plant Genetic Resources. In 1999, the CATCN PGR was established, involving all eight CATC countries, Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. Due to financial constraints, the region's national genetic resource institutes' links with other research institutes have become weak. The national institutes' abilities to collect, conserve and document local and exotic genetic resources needed to be enhanced. Within this network, nine Crop Working Groups are established. The Network

is coordinated by the Coordination Committee at the regional level and by PGR National Coordinators at national levels. Moreover, each country, member of the Network is responsible for coordination of the work of certain Crop WG at regional level. Major funding was obtained from WB, ACIAR, GEF, CGIAR, and USDA.

The network can be characterised as relatively young, formalised, and depending on mixed, external funding. It has strong support from the CGIAR, i.c. ICARDA and IPGRI, and exclusively co-ordinates the activity of former Soviet Union states with a similar political background. Also similarities in agro-ecologies and crop history exist.

Crop-specific networks

COGENT. The International Coconut Genetic Resources Network. In 1992, IPGRI established COGENT to promote a world-wide programme for the conservation and use of the genetic resources of this crop. Its priority action areas include the establishment of an international coconut genetic resources database; collecting, conserving and evaluating representative diversity and promoting its use; and developing strategies and techniques for efficient germplasm conservation and use. At present, COGENT has 38 member countries. The network has multiple donors. It is managed as part of an IPGRI project.

The network can be characterised as administratively integrated into IPGRI's project management structure, but with an external Steering Committee. It also has a strong focus on conservation, and oversees international field genebanks. Its multiple donor funding is a typical feature.
INGER. International Network for Genetic Evaluation of Rice. The organized dissemination of improved rice germplasm and genetic donor lines has been the role of the International Network for Genetic valuation of Rice (INGER), formerly the International Rice Testing Program (IRTP), for more than 20 years. Since the network's foundation, INGER breeding materials have been used to develop more than 570 rice varieties released in 62 countries. Like COGENT, the network can be characterised as highly integrated into a CGIAR centre, in this case IRRI. The network is exclusively utilisation-oriented. It has been long-lasting and has a wide membership.

LAMP. Latin American Maize Project. LAMP was initiated by a donation of US $1.5 million from Pioneer Hi-Bred International to the U.S. Department of Agriculture (USDA) Agricultural Research Service (ARS) to carry out a five-year maize evaluation project (Salhuana et al., 1991). LAMP involved co-operation of 12 countries: Argentina, Bolivia, Brazil, Colombia, Chile, Guatemala, Mexico, Paraguay, Peru, United States, Uruguay, and Venezuela. LAMP's main objective was to evaluate the agronomic characteristics of maize accessions in U.S. and Latin American germplasm banks.

LAMP is a model to study, although it is likely to succeed only for crops that have large commercial interests behind them. The project has now been terminated. It functioned as a network. A typical feature is that it operated on private funding and had a strong focus on utilisation. It was co-ordinated by CIMMYT and US/ARDS and undertook a massive evaluation programme. The Latin American Maize Network on Plant Genetic Resources (LAMP-PGR) and the mainly US-based Germplasm Enhancement of Maize (GEM) project are follow-ups to ARS' multinational Latin American Maize Project.

SAVERNET. South Asia Vegetable Research Network – II. SAVERNET is active in six South Asian countries: Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka, and is coordinated by AVRDC. Its objectives are to evaluate superior varieties of tomato, eggplant, chili and onion identified in SAVERNET and to develop and test technology packages for adoption by farmers in their fields; and to continue and consolidate research progress made in various fields during Phase I.
The implication is that genetic resources management is only a smaller activity in this network, that contains integrated pest and disease management activities, as well as technology transfer ('translating research into farmers' applications') as major activity lines.

Thematic networks

SINGER. The System-wide Information Network for Genetic Resources. SINGER is the genetic resources information exchange network of the International Agricultural Research Centres of the Consultative Group on International Agricultural Research. It provides access to information on the collections of genetic resources held by the CGIAR Centres. Together, these collections comprise over half a million samples of crop, forage and tree germplasm of major importance for food and agriculture.

SINGER is a highly formalised network that was established with the specific objective of developing and maintaining a major database of the plant genetic resources collections held by the CGIAR Centres. Thus, in origin SINGER is an example of a CGIAR-internal network. More recently it has served as a model for EURISCO and for AVRDC in developing its Internet-based information system on vegetable genetic resources. SINGER is promoting and catalysing development of regional multi-crop and crop-specific information networks and through links to such networks, such as EURISCO, it aims to be a major contributor to the global information system on plant genetic resources as called for by the Treaty and GPA. SINGER is also promoting and catalysing development of cross-sectoral information systems within the CGIAR that will encompass fish and livestock and forest resources, with the intention of contributing to global biodiversity information initiatives of the FAO and CBD.
EURISCO. European Internet Search Catalogue. In 1999, the EU approved a project to establish a European Plant Genetic Resources Information Infra-Structure, EPGRIS. An infrastructure for information on plant genetic resources (PGR) maintained *ex situ* in Europe was established by (1) supporting the creation and providing technical support to National PGR Inventories, (2) creating the European PGR Search Catalogue EURISCO with passport data on ex situ collections maintained in Europe. The currently established EURISCO network consists of national focal points, a secretariat, and a Steering Committee. It receives modest continued funding from ECP/GR and modest input-in-kind through IPGRI.

Like SINGER, EURISCO is a highly formalised network and focuses on the specific objective of developing and maintaining a major database of the European collections. Training is a more important component than in the SINGER network.

In situ-oriented networks.

UPWARD. Users' Perspectives With Agricultural Research and Development. UPWARD is a network of scientists and development specialists working to increase participation by farmers and other users of agricultural technology in research and development. Launched in 1989 under the sponsorship of the International Potato Center, UPWARD seeks to address three important challenges facing agricultural research and development today: linking users and R&D professionals for more effective agricultural innovation; bringing sustained benefits to less favoured farming areas and marginalized groups, especially women; and working with households and local communities as key actors in problem diagnosis and research activities. UPWARD emphasises direct-involvement by end-users and intermediate agencies in agriculture-related innovations to ensure its acceptance and sustainability.

UPWARD is an on-farm oriented network in Asia on specific crops and co-ordinated by a CGIAR centre. A conspicuous feature is the involvement of various stakeholder groups.

CBDC. Community Biodiversity Development and Conservation programme. The CBDC programme is a global initiative developed by governmental and non-governmental organisations (GOs and NGOs) involved in agricultural initiatives in Africa, Asia and Latin America, in co-operation with Northern partners. The purpose is to strengthen the ongoing work of farming communities in conserving and developing the agricultural biodiversity that is vital to their livelihood and food security.

CBDC can be characterised as an initiative that started off as a programme and gradually developed into a network. It also evolved from a more technically oriented programme of national components into a more politically oriented network active at national and international levels. The network is strongly dependent on funding of multiple donors.

A limited number of networks were also initially selected for study but eventually not incorporated in this report due to lack of sufficient response from the programme coordinators and/or informants, and/or limited documentation available (ECABREN, CBN, PROMUSA) or failure to identify relevant information sources in an early stage (WBN, CLADES). Additional information of these networks is given in Annex 1.

2.5 Network matrix

Network matrices may serve to provide insight in the distribution of the selected case studies in a multi-dimensional structure reflecting major groupings according to geographical location, crop of interest, and area of activity. Therefore, two matrices are presented here. However, it should be borne in mind that the objective of developing these matrices was not in the first place to guide the selection of networks for the case studies but to provide an impression on how the selected networks cover the various dimensions. As elaborated above, a different set of criteria was used for selection of candidate networks for case studies. If dimensions introduced here would have been used to select networks for the case studies, this might have led to a biased selection not representing the best functioning networks but only representing some relatively well functioning networks per grouping.

A first matrix was developed to visualize the distribution of the networks over various regions and crop groups. A second matrix attempts to reflect the relation of the selected networks to the various priority areas of the FAO Global Plan of Action, as well as their geographical location.

Table 2. Matrix depicting the distribution of selected networks over geographical regions and major crop groups.

Crop groups	**Regions**								
	LA	NA	EUR	CWANA	SSA	SA	SEA	EA	AP
Cereals	**X**	**X**				**X**	**X**	**X**	
Legumes					**X**				
Root and tuber crops					**X**		**X**		
Forages									
Vegetables						**X**			
Fruits									
Herbs and medicinal crops									
Industrial crops	**X**				**X**	**X**	**X**		**X**
Regional activities*	**X**		**X**	**X**	**X**		**X**		

LA: Latin America; NA: North America; EUR: Europe; CWANA: Central and West Asia and North Africa; SSA: Sub-saharan Africa; SA: South Asia; SEA: South East Asia; EA (East Asia) AP: Australia and the Pacific
* Activities of regional networks are only presented in this section of the table and not included in the activities by crop group.

2.6 Development of a structure for the case studies

The case studies consisted of the following elements.

A communication with contact persons and additional informants on the selected networks, as specified below, and a preliminary analysis of the acquired response. In collaboration with the contact persons of the networks a questionnaire was used to reach selected additional informants.

In parallel, a detailed analysis of documents obtained on the networks. Documents were analyzed using the criteria provided above. Case studies on some networks were discontinued due to lack of access to valuable information.

A comparison and synthesis of the information on the individual networks, analyzing the relevance of the individual criteria as parameters for measuring the success of the network.

2.7 Communication plan to contact selected networks and their stakeholders

Whereas the previous Background Study made a first attempt in assessing the successfulness of PGR networks, the authors comment that they were almost exclusively relying on information provided through the internet. Although such information gives an accurate overview of the objectives of networks, most web-based information is scarce on recent relevant activities, and contains very little information to assess the success of a network and the factors determining such success. Therefore, an alternative approach had to be developed to obtain relevant information on the functioning of networks.

In developing this approach, it was reasoned that contact persons and others involved in the networks themselves would form a first source of information, whereas other stakeholders, such as representatives of research institutions and extension services, local communities, national government agencies, and donors would form another source of information, each group probably having different perspectives and expectations from which to assess the success of the networks.

Therefore, it was attempted for each of the selected networks to identify the contact persons as well as informants in each of the stakeholder groups. To identify valuable informants, contact persons and other persons with inside information at FAO, the CGIAR centers, and at national governments (donors, national focal points of the CBD and of FAO) were requested to provide the names and contact details of potential informants. The contact persons were preferably approached in person, or by telephone, whereas the other informants were approached by post or e-mail. A questionnaire was developed to obtain information from the network contact persons. This questionnaire was built on the self-assessment developed by FAO and IPGRI (document CGRFA/WG-PGR-2/03/6, annex 2, available through the Internet (http://www.fao.org/waicent/FaoInfo/Agricult/AGP/AGPS/pgr/ITWG2nd/pdf/P2W6E.pdf). A preceding extension enquired about the contact persons' views on the functioning of the network. The contact person was also asked to provide names and contact details of informants.

A similar but shorter questionnaire for informants was developed in close collaboration with the contact persons.

A summary of the communication plan is presented in Table 3.

Table 3. Communication plan to contact informants on selected networks

1. Define categories of informants according to stakeholder groups.
2. Approach contact persons of networks and key persons in international organizations and national governments to provide informants by stakeholder category.
3. Inquire after the willingness of contact persons to function as mediator to obtain the collaboration of the selected informants.
4. Develop a questionnaire for contact persons to obtain desired information including an introductory section in a cover letter explaining the purpose of the questionnaire, and announcing feed-back.
5. Develop a questionnaire for informants to obtain desired information including an introductory section in a cover letter explaining the purpose of the questionnaire, and announcing feed-back.
6. Develop a small list of collaborators from the key persons under 2. who may meet contact persons or informants in person in meetings, country visits or otherwise.
7. Determine by which mode of communication contact persons can be reached (directly/indirectly; in person, by telephone, mail or e-mail).
8. Determine by which mode of communication selected informants can be reached (in person, directly or indirectly; mail or e-mail).
9. Follow up the obtained response for clarification and further information where necessary.
10. After completion of a first draft analyzing the success of a network, communicate this draft amongst the contact persons for comments and improvement.

The approach entailed a major role for the network coordinator, who might have a biased view on the functioning of the network. Therefore, it was foreseen to interview stakeholders or to request them to fill in a questionnaire to correct for such potential bias. This latter approach has only been partly successful since the number of stakeholder respondents remained low and was not well distributed over the networks.

Figures on the involvement of informants having provided responses to the study questionnaire (annex 4) are listed below.

Table 4. Overview of informants (including contact person)

	ECP/GR	SPGRC	SABONET	CATCN/PGR	COGENT	LAMP/N	INGER	SAVERNET	EURISCO	SINGER	UPWARD	CBDC
Informants who provided information	10	3	4	4	3	6	12	1	3	4	5	3

CHAPTER 3: ANALYSIS

This chapter contains 'selected citations' of the informants for this study in boxes by way of illustrating the issues analysed.

3.1 What makes PGRFA networks special?

The global society has become ever more complex, and communications facilitate intensive interactions by widely dispersed partners; as a result, a large number of studies have been conducted to understand the characteristics of networks. Apart from publications on plant genetic resources and research networks, mostly described in earlier studies (Watts, 2002; Kalaugher and Visser, 2003), various more general studies reflecting on common patterns in networks have emerged. Networks exist in many different environments, ranging from social networks in research organisations and corporations to networks between living organisms and in natural food chains. Barabasi (2003) indicated that all of these networks can be explained and understood using the same concepts, and the same mathematics. These can therefore also apply to plant genetic resources networks.

At the same time, some features make plant genetic resources networks special:

- In addition to dealing with knowledge, PGR networks generally deal with physical entities (seeds and plants) that represent an economic asset, and need collaboration to allow full maintenance and exploitation.
- Because of these maintenance obligations and the fact that no income is generated from the maintenance of the assets, effective collaboration is often dependent on funding that is external to the network proper.
- PGR networks often involve disparate stakeholder groups, and many exhibit a scientific, technical and a policy 'layer'.
- PGR networks are almost invariably international in composition.

3.2 Network objectives

Elaborate processes of setting objectives prior to the network establishment and the use of effective tools for needs assessment and priority setting have resulted in clear objectives in all networks. Among informants and coordinators the question on "clear objectives" scored 4 to 5 on a scale of 1 to 5 (with 1= low and 5 = high). Some networks that are established as an integral part of wider-ranging network programmes provide specific contributions to the objectives of these wider-ranging networks, such as SINGER, that is integrated into the System-Wide PGR programme of the CGIAR. Other networks have become to function as platform for the implementation of GPA at a regional level (ECP/GR, SPGRC, and CATCN-PGR).

Selected citations
On CATCN-PGR
There is a strategic vision shared by all participants that development at the national level can best be mobilized at the regional level.
On CBDC
Although different in many ways, the participating organizations shared basic values and could therefore agree on a common approach to major challenges in the interface of technology and policy.

Bottom-up participatory processes for setting objectives and priorities are common to all the networks, either through Steering Committees comprising of national or member organisation representatives, and/or through a system of regular workshop meetings. There is a tendency to favour Steering Committees as instruments of decision making. Network management involves a variety of needs assessment instruments, including surveys, consultation visits, strategic meetings and sometimes external reviews. Consultation visits and meetings have been more effective in setting priorities than network surveys. Some stakeholders claim that more meetings and stronger regional representation are needed to deal with topics like IPR (INGER) and to better reflect regional and national needs and priorities (COGENT).

Table 5. Priority setting instruments used

	ECP/GR	SP GRC	SABONET	CATCN/PGR	COGENT	LAMP/N	INGER	SAVERNET	EURISCO	SINGER	UPWARD	CBDC
Steering Committees	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**
Project Meeting Workshops		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Surveys/Questionnaire	**X**		**X**		**X**			**X**	**X**		**X**	**X**
Consultation visits		**X**		**X**	**X**	**X**	**X**	**X**			**X**	
External Reviews		**X**			**X**					**X**	**X**	**X**

3.3 Type of activities

The type of activities varied from network to network. Table 6 below provides an overview of major activities by selected network.

No clear correlation appears to exist between the type of major network activities and the successfulness of a network. In other words, networks with limited scope or limited ambitions do not necessarily result in limited success, nor do networks with high and/or wide ambitions necessarily falter because of such ambitions.

On the one hand, limited efforts tend to be spent on technology transfer, and joint research seems to be a matter of partners within the network, rather than of the network as a whole

On the other hand, most if not all networks included in the analysis are involved in exchange of germplasm, and training form a substantial activity in most of the networks.

Obviously, information sharing is a sine qua non, but it should be stressed that the level and intensity of information sharing varies from network to network.

Selected citations
On ECP/GR
In the European network there is a tendency to centralize activities (e.g. EURISCO). The investments into the central programme components must facilitate work of the satellites of the system (central crop database managers, chairs of the working groups), which is the intention. If the benefits are not there, let's say in two to three years, there is a risk of loosing interest of database managers in networking with the central group.
On SAVERNET
Sharing the germplasm, sharing the information and technologies, exchanging ideas, serving as resource person in another country were primarily responsible for the success of the network.

Monitoring and facilitating exchange of information and technology by the network coordinator paved the way for a successful network.

Table 6. Major activity types

	ECP/GR	SPGRC	SABONET	CATCN/PGR	COGENT	LAMP/N	INGER	SAVERNET	EURISCO	SINGER	UPWARD	CBDC
Information sharing	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Technology transfer			**X**	**X**				**X**				
Training		**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**
Joint research	**X**				**X**	**X**	**X**	**X**			**X**	**X**
Task sharing	**X**	**X**		**X**	**X**							**X**
Germplasm exchange	**X**	**X**		**X**	**X**	**X**	**X**	**X**				

3.4 Outputs

Being the "ultimate participatory organisation", networks must still produce tangible and non-tangible results to satisfy members to survive in the long run. Networks need to offer cost-effective means to translate objectives of the members into outputs, be it individuals, institutions or governments, which otherwise could not be achieved or only at much higher costs. A measure of the quality and quantity of outputs and the use of these outputs by the members provide the means of differentiation of success among the networks.

To aid in understanding the relational processes at work in networks we can distinguish between *pull* and *push* factors, indicating various benefit levels and member interactions. *Pull* factors actively draw members to participate into the network, mostly conditional factors set by the network itself. *Push* elements are more subjective and can be –at times - ambivalent such as international exposure, publication, professional ambition and gain in know-how. However, at the higher levels of membership *push* factors can be tangible, such as economic benefit and implementation of globally and nationally agreed policies. The next table (Table 7) is useful to distinguish between tangible *pull* factors and non-tangible *push* factors and to aid in the development of potential indicators for measuring results of networks.

Table 7. Vectors in Network Member Benefits

Member Level	Push factor	Pull factor
National level	Policy Development (CBD, GPA, IT) Economic benefit	Clear objectives Transparent Priority Setting process International representation
Organizational level	Policy development (CBD, GPA, IT) Donor objectives Organisation's objective to seek wider network	Clear objectives and priority setting process Access to: - Capacity development - Collaborative Research - Plant Genetic Resources - Funds for programme implementation and Workshops - International exposure
Individual level	National and organisation's policies Individual Ambitions, Professional gain	Clear objectives and priority setting process Access to: - Training

		- Collaborative Research - International/Regional exposure and recognition - Forum for publication

Without exception, all networks have listed impressive outputs in terms of training, collaborative research, database management, publications and various types of other information services (see Table 8). Training and collaborative research programmes, including exchange of germplasm are important elements of plant genetic resources programmes, and provide crucial *pull* factors. In terms of training, ECP/GR is the only network which does not have a fixed provision for capacity development, but its training is provided through externally funded programmes and national government funds. A few networks such as SABONET are focussing entirely on capacity development. Training is also used as a tool for creating awareness among stakeholders and policy makers such as in CBDC and COGENT. Some networks have been particularly successful in making genebank information available to users (ECP/GR, SINGER, and EURISCO). Other networks, especially those with a stronghold in collaborative research, have been quite solid in terms exchange of germplasm (INGER, LAMP/N, GEM, SAVERNET) and work on scientific and popular publications, such as newsletters (UPWARD, SABONET, ECP/GR, SAVERNET, CATCN-GR).

Table 8. Rating of Network Output* (1-3, high=3, low=1)

Rating	ECP/GR	SPGRC	SABONET	CATCN/PGR	COGENT	LAMP/N	INGER	SAVERNET	SINGER	EURISCO	UPWARD	CBDC
Training	1	3	3	3	2	2	2	3	2	3	3	3
Collaborative Research	1	1	3	3	3	3	3	3	3	1	3	3
Database on PGR	3	2	2	2	2	2	2	3	3	3	1	1
Publications	2	3	3	3	1	2	1	3	1	1	3	2
Other Information Services	3	1	2	2	1	1	1	1	3	2	3	1

* Subjective rating by network coordinators

Analyses of the rating of coordinators and informants on the quality and quantity of network outputs provided a measure of the realized benefits and the effectiveness to translate network objectives into outputs. Overall the ratings were fairly high in most of the networks (rating 4 or higher) indicating a high level of output satisfaction with stakeholders. Fair scores were observed with respondents in CBDC and SPGRC (3-4), not so much because of lower quality of outputs, but rather because of limited absorption and use of outputs by the members. Similar indications were observed in terms of quality of internal communications. The ratings also revealed some differences between the coordinator's perception and that of the informants, but the interpretation of this classification was difficult because of bias in the response of the coordinators, and because the number of informants responding was unevenly distributed among the networks.

Selected citations

On ECP/GR

I would like to see an assessment of the network's results across individual member countries. Not just a global overview of the network progress without looking into the (often massive) problems that individual member countries have to keep up with network activities.

On SPGRC

When SPGRC was established in 1989 none of the countries of Southern Africa had programmes on PGR. Now every country has a programme recognised and funded by appropriate government departments. Now all countries have PGR trained personnel running the programmes.

On COGENT

The network has simplified the procedure of germplasm exchange and also increased the accessibility of diverse genetic resources. The most positive aspect of the network is that it enhances capacity building for researchers on coconut around the world.

On INGER

INGER germplasm has directly or indirectly contributed to almost all the rice varieties recently released in member countries.

On INGER

The INGER approach in providing free access to germplasm significantly increased the genetic diversity in the Philippines. INGER provides an effective linkage to accelerate the genetic improvement of rice. It has crossed all political, religious, cultural and philosophical boundaries which made an impact on the rice production of the recipient countries.

On CBDC

I have learned to see problems from community perspectives as they appear in the South, and we have got opportunities of bringing science and technology into a fruitful interaction with perspective that reflect challenges and aspirations at the community level.

Have outputs been realized in an efficient and cost-effective way? Although some details concerning annual budget of network operations were collected, the authors soon realized that it was not feasible to make a financial comparison among the networks studied within the framework of this study. First, budgets could not be simply compared since budget items are complex and consist of several elements, requiring extensive discussions with the coordinator to untangle items and separate between funds for core and programmatic activities. Second, it appeared difficult to value the outputs, as for genebank activities in general. To provide a satisfactory answer to this question, a fundamental financial analysis of networks based on pre-determined criteria should be carried out.

3.5 Organization

Closed or open networks

Ten out of the twelve plant genetic resources networks included in this study have the characteristics of a closed network, are formalized through signed agreement or protocol, and have a relatively high proportion of active member engagement. Membership in closed networks tends to grow as more countries or organizations join the network, but expansion usually takes place by invitation only and seems to be limited to a maximum of approximately 40, although the number of active individuals in the network, attached to institutions and organisations, can be many. Whereas regional networks appears to be limited by their own boundary, at other closed networks the number of members may be fixed because of limitations of what one defines as a manageable network community.

At the other end of the spectrum are two open networks, namely INGER and UPWARD, that rely on free engagement and are typically characterised by a relatively high turnover of annual membership. In terms of total membership, open networks on plant genetic resources have considerable more members than closed networks; however, it remains well below one hundred members and members organisations, presumably because of the specialized nature of such networks. In all cases studied the choice to opt for a closed or open network was a pre-determined move prior to the network's establishment, which came after a long period of deliberation and consensus building with potential partners/members.

The distinction between open and closed networks is not absolute. Open networks may require membership fees either in kind or cash (GEM), ask members to adopt a code of conduct (INGER) or actively participate in one or more network activities (UPWARD), all of which may set different thresholds parameters for network membership. Closed networks may also require members to fulfil one or more of these criteria, but in addition may ask potential members to submit themselves to screening procedures to determine membership eligibility. Administrative procedures may be relaxed to allow maximum membership like in COGENT, where members only have to write to IPGRI to become a member.

Table 9. Open and Closed Networks

	ECP/GR	SPGRC	SABONET	CATCN/PGR	COGENT	LAMP/GEM	INGER	SAVERNET	EURISCO	SINGER *	UPWARD	CBDC
Open Network (free engagement)							**X**				**X**	
Closed Network (formalised engagement)	**X**	**X**	**X**	**X**		**X**		**X**	**X**	**X**		
Type of formalisation												
Formal agreement	**X**	**X**	**X**	**X**		**X**		**X**	**X**	**X**		
Protocol / Code of conduct					**X**	**X**	**X**					**X**

Membership Dues	**X**	**X**										
Active Membership	**Stable**	**Very stable**	**Stable**	**Very stable**	**Stable**	**Stable**	**Fairly Stable**	**Very stable**	**Stable**	**Very stable**	**Not Stable**	**Very stable**
Type of Membership												
Individual						**X**	**X**				**X**	
Research Organisation					**X**	**X**	**X**		**X**	**X**	**X**	**X**
Ministerial/Departmental Level	**X**	**X**	**X**	**X**	**X**	**X**		**X**				

* IARCs are automatically members of SINGER

The disproportion between open and closed networks might suggest that open networks on plant genetic resources are the exception. As plant genetic resources networks deal with valuable germplasm and germplasm exchange, realistically some type of formalisation would be expected, especially in the light of growing concern on Intellectual Property Rights (IPR). Further analysis shows that there are more motives underlying the choice in favour of a formalised network, which includes:

- *Policy support*; Regional networks such as ECP/GR, SPGRC, and CATCN-GR, SABONET and SAVERNET, but also typical germplasm information networks like EURISCO involve national genebanks and government research stations, requiring formalisation at departmental or ministerial level. Such formalisation has the added benefit of a firm commitment from the member country governments in terms of policy support, which may contribute substantial in-kind contribution and/or member dues.
- *Formalization of commitments*; Sometimes the network requires clear commitments on contributions on germplasm exchanges and in-kind contributions to network activities, such as staff input and meeting venues, which will facilitate the performance of the network. This needs protocols or contracts to be signed or agreed on programme or project basis. Such arrangement is particularly evident in crop specific networks like COGENT and LAMP/N.
- *Sense of community*; when the membership is limited, frequent interaction among the members creates a sense of vision, purpose and eventually generates ownership. Whereas this is a factor in all networks, some networks, like CBDC, have focused to formalize such sense of community more than others to create a platform for discussion and action.
- *Donor requirement*; A closed network may be required by a donor especially when the donor funds a large part of the activities in the network, like in the case of CBDC, SAVERNET and SABONET.

Keeping in mind these motives for a formalized network, what are the reasons for some networks to opt for an open membership? Both INGER and UPWARD are research networks and benefit from an ideology to involve as many members as possible, although from a different point of view. While INGER benefits from increased rice germplasm exchanges between the NARS and IARCs, UPWARD profits from increased information exchange and dissemination of participatory research methodologies. Root crop genetic resources in UPWARD focus on *in situ*/on-farm management and no germplasm exchanges are taking place beyond the country of origin. Despite being open networks, a good sense of community is created through clear objectives, quality of information, training and workshops. Since INGER entirely revolves around germplasm exchanges, the network would be expected to adopt some kind of formalisation. In a sense it has, because members are made aware of the code of conduct, and since 2001 network partners use a Material Transfer Agreement (MTA). However, the dominance of the INGER secretariat combined with core funding from IRRI and the proven mutual value of the rice seed nurseries has allowed the network to exist in a dynamic open structure. Similar secretarial supremacy and core funding is visible in UPWARD.

Taking this point a step further, one could argue, that other networks such as SAVERNET and COGENT could, in principal, be well functioning as an open network, but these networks have

clearly opted for formalisation into closed networks for reasons described above. Obviously, such decisions do not necessarily result in less successful networks.
The conditions in which networks operate vary so much that it is difficult to indicate what type of network is more successful. What seems important is to make well-balanced decisions prior to establishment of the network, and to establish a management mechanism enabling the network to translate objectives efficiently into outputs and to have a sound member-based priority setting process.

A comparison to Greiner's Growth Model

A screening of the historic development in organisational growth of the networks and a study of the characteristics of participatory development and management structures of the networks revealed few major organisational changes. When compared with Greiner's organisational growth model, most networks studied here started from an informal network structure, and appeared to jump directly to organisational structures which fall somewhere in between the delegated and coordinated organisation model (phases 3 and 4 respectively), with a few networks touching at the phase 5 collaborative model. Apparently, many PGR networks purposely skip phase 2, and move immediately to phases 3 and/or 4[2]. Among the 12 analysed networks ECP/GR has been evidently the ultimate "learning organisation". With 24 years of existence ECP/GR is one of the oldest, and with 36 member countries, numerous institutions, sub-networks and working groups, by far the most complex organisation. It is one of the few networks in which considerable experience was gained with different modes of member representation and network management. This included a transfer from a Governing Board to a Technical Consultative Committee, and later into a Steering Committee composed of National Coordinators. The network ECP/GR was one of the first plant genetic resources networks to introduce membership fees, and engaging members firmly in the functioning of the network, and it experimented with varying forms of member contributions and network management systems. ECP/GR also exhibited problems concerning control and runs the risk of a crisis of red tape.

Learning processes at other networks are more limited. At INGER a major change in coordination at the priority setting process evolved when CORRA in 1998 took over charge from the INGER Technical Steering Committee. COGENT evolved from a small network managed by a Steering Committee devoting resources to it on a part-time basis, to a professional organisation with a full time coordinator and staff and a large set of projects. The focus of COGENT on attracting and securing external funding has been crucial to the success of the network, but has tended to take the network effectively out of the hands of the membership and put it in the hands of professionals, thereby *de facto* regressing on Greiner's scale of organisational development. Notwithstanding, decisions on priority research and training activities are still decided by the COGENT Steering Committee. In addition, recently, COGENT sub-regional networks for South Asia, Southeast and East Asia, South Pacific, Africa and the Indian Ocean, and Latin America and the Caribbean are being organized under the leadership of elected representatives of each region, which move is expected to enhance members' participation, sense of ownership and overall network sustainability.

Some organisational structures of networks are donor and project driven. SABONET evolved from years of informal meetings and preparations into a Coordinated Network in 1996/7, once funds became available. When funds will dry up in 2004, the network is expected to return to its previous informal structure. Similarly, the ADB was instrumental in the establishment of SAVERNET and its organisational structure in 1992, involving a Steering Committee with national representatives. The network has experienced few structural changes since then. In CBDC, which is perhaps the flattest organisation, partner equality in the decision making process was built-in in the organisational model from the beginning. Changes in the coordination process rather stemmed from matching tasks with

[2] For practical reasons (little information available, no network coordinator, little structure) the study did not include phase 1 informal type of networks, some of which may have been successful in their own way, but focused entirely on institutionalised networks.

personal skills and qualities and from sharing burdens, and with streamlining thematic orientations among the members.

In view of the above, network success seems not directly related to a particular organisational model but is rather associated with the responsiveness of the network to react to different environments and member needs. Such responsiveness necessitates the establishment of a clear organisational structure with effective member participation in the network's priority setting process.

Quite a few studies of network effectiveness confirm that strong network coordination is an important component in successful networks (cited in Watts, 2000). Evidently all networks in this study have a secretariat and a full-time network manager employed to coordinate the activities in the network at both the strategic level and the output level. A high level of communicating skills, strong support towards network members and effective linkages with the donor community are elements attributed to a network coordinator providing success to the network. Typical facilitating-mainly roles are found in networks like ECP/GR and SINGER, which includes: coordinating meetings, stimulating information exchange and communication. In other networks such as COGENT, SAVERNET, LAMP/N, INGER and UPWARD, the coordinator has the additional crucial role of fund raising and joint proposal writing.

Selected citations

On ECP/GR

The weak point was the capacity of the network to maintain all participants active. In order to have manageable meetings we established a system of participating and non-participating members, which was never very satisfying.

On SABONET

A clearly defined management structure, with functional units and components formed a strength. In addition, the role of each unit in relation to other units in the structure of the network has been clear, which has helped to avoid confusion.

I sincerely believe that SABONET has been very successful because it is a network that was carefully planned. Thanks to the wisdom and experience of the people who were involved at the design state.

On LAMP

I think that there are two important factors to the well functioning of the network: CIMMYT management and international financial support. In the absence of one of them, the network would be negatively affected.

On SINGER

A full-time coordinator forms the basis for solid management. Also, partners wanted leadership by the coordinator. To hire a full-time coordinator was an active decision of the steering committee.

On SINGER

While SINGER has evolved very rapidly, it lacks a mechanism to ensure that all partners have the opportunity to capitalize on the results of the network. This is particularly valid for tools such as GIS or web-enabling tools where funding was lacking to ensure that members properly used the software products.

On UPWARD

Networks must have a well functioning steering committee which will serve as a centre of information exchange. But a steering committee must not dominate the work of the network; its main role is facilitation.

On CBCD

We actually have no umbrella organisation. Finance management and reporting to donors has been burdensome and difficult for many partners and a headache for the partner managing the administrative unit.

Staff rotation and power relationships within member country's organisations may result in inefficiencies at Working Group and Steering Committee level, which can be demotivating and affecting the output of the network. Influence of the local organisational culture on the effectiveness of

network bodies have been mentioned by a number of networks, including ECP/GR, EURISCO, SPGRC, and SAVERNET.

Table 10. Network Management

	ECP/GR	SPGRC	SABONET	CATCN/PGR	COGENT	LAMP/N	INGER	SAVERNET	EURISCO	SINGER	UPWARD	CBDC
Network Coordinator /Secretariat	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
International Umbrella Organisations	IPGRI	SADC	None	IPGRI/ CWANA	IPGRI-APO	CIMMYT	IRRI	AVRDC	ECP/GR/ IPGRI	IPGRI	CIP	None
Network to Network Synergies	EURISCO GRENEWECA			CAC documentation	BUROTROPAPCC				ECP/GR SINGER	EURISCO	ANSWER	BUCAP

<u>The role of an umbrella organisation</u>
Umbrella organisations contribute to critical expertise and resources to assist the network in carrying out its mandate, such as office space, materials, core funding for staffing and meetings, and in some instances serve in gap-filling when funds temporarily dry up, and sometimes are involved in direct fundraising. Even more important than the managerial support tasks is the function of the host organisation in facilitating the network to function as a platform for regional and global affairs on the implementation of the FAO GPA. This role of providing vertical linkages is for example evident in ECP/GR and SPGRC that each forms the implementing mechanisms for the FAO GPA. Network-to-network collaboration may mean a natural extension of the mandate of the involved network providing expertise and "best practices" to aid in the establishment of other networks, such as SINGER assisting EURISCO, and ECP/GR assisting in other regional PGR networks, such GRENEWECA.

The position of IPGRI as umbrella organisation is unique in that the organisation serves as a "facilitator and catalyst" of actions taken by various institutions including networks in the area of conservation and use of plant genetic resources. Generally, IPGRI does not take direct responsibility for the management of genetic resources but seeks synergistic partnerships in accomplishing its mandate. In this position, IPGRI has been effectively involved in the establishment of several PGR networks. Out of twelve networks studied, the CGIAR centres function as umbrella organisations in seven cases of which IPGRI in five cases. SADC and AVRDC are the only non-CGIAR international umbrella organisations, AVRDC retaining strong links with the CGIAR, including IPGRI.
CBDC and SABONET are the only networks lacking an international umbrella organisation. Informants noted the absence of an international umbrella organisation as a flaw, but also indicated that the strong own networks of the member organisations reduced the need for such umbrella organisation. The advantage of host organisations lies perhaps in the subtle task of host organisations to warrant network sustainability by slowly building regional and global support and in donor relations, which evidently is crucial as funds tend to dry up.

3.6 Source of funding

Networks must have resources to function, and a well funded network staffed by committed human resources will facilitate significantly obtaining network results. Following the previous paragraphs on organisational strength and human resources in network coordination, how important are funds and fundraising concepts for the success of a network? Are funds indeed, as some claim, the foremost important factor to success?

Selected citation
Everybody says: "networks work only when there is money", and usually this money is externally sourced. But cynicism aside, networks are great contributors to professional interactions and friendships across institutions, countries and regions. They certainly cost less than waging war. They are valuable shapers of internationality in humanity.

Plant genetic resources networks often start in an informal atmosphere of breeders, curators and scientists utilizing little or no funds, but once a network is established, considerable funds are needed to provide members the means to achieve the network's objectives. Donors may fund the start-up phase, but few are prepared to fund the network for more than an initial series of years. Some donor agencies and host organisations provide long-term core funding to ensure the continued operation of the coordinating unit and various elements of the network, but let the network itself seek funds for the programmatic output. Out of the twelve networks studied, only SAVERNET (funded by the Asian Development Bank and several other donors), CBDC (funded by a four-member donor consortium), and SPGRC (funded by the Nordic countries) were able to secure funds for a prolonged period. Factors in this long-term engagement were proven regional economic significance of the network, and contributions of the network to the theme of plant genetic resources *in-situ* management. SPGRC is an exceptional case in that it was established in 1989 with a secured 20 year funding from the Nordic and the SADC countries. The arrangement is unique in that the provision includes member countries to share the cost of the network through payment of annual dues and in-kind contributions in a gradually increasing fashion. The position of SINGER in the CGIAR system means that it receives an annual allocation of the multilateral donor funding allocation to SGRP that ensures its core activities of coordination and database maintenance. This is significant since it provides a relatively stable funding base for the essential operations of the network upon which it has been possible to raise bilateral funding for further research and development activities. In the other cases studied, networks are to a varying degree dependent on external funding. Well before the initial funding dries up, networks should therefore have set in motion mechanisms to secure funds for necessary survival.

Table 11. Funding Mechanism

	ECP/GR	SPGRC	SABONET	CATCN/PGR	COGENT	LAMP/N	INGER	SAVERNET	EURISCO	SINGER	UPWARD	CBDC
Self funding proportion*	**90-100%**	**50%**	**0-10%**	**40%**	**40%**	**50-60%**	**n.a.**	**10-15%**	**15-20%**	**90%**	**n.a.**	**20%**
Secured Funding												
Full Programme	**X**	**X**	**X**								**X**	**X**
Core Activities				**X**	**X**	**X**	**X**	**X**	**X**	**X**		
Type of funding												
CGIAR	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**	
Multilateral Donor	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Bilateral Donor		**X**			**X**	**X**		**X**	**X**	**X**		**X**
Private Sector						**X**				**X**		

* estimate by coordinator

As much as funds are required to keep the network floating, the presence of fundraising capacity is a pre-requisite to move the network forward. Fund raising requires specific skills and creativity to develop an idea into a sound donor funding proposal. In addition, it requires a great deal of time and resources. The tendency within the networks is therefore to rely heavily on the permanent staff of the

coordinating unit, especially the network coordinator, to elaborate proposals and keep in touch with potential donors. In the event that the network relies heavily on external funds, the skills of the coordinator in performing these tasks may to a large extent determine the success of the network.

In some networks, directed activities are undertaken to build fundraising capacity among the members. Partnerships between the coordinator and members in jointly developing ideas and work out proposals are evident in most networks, but perhaps most notable in UPWARD and COGENT. COGENT furthermore provides special training in proposal writing skills, lobbying and donor relations. In ECP/GR, fundraising has largely been delegated to the member countries, the secretariat offering support to consortium formation and project formulation. This network has been an ideal platform for members to seek partnerships in developing proposals, especially for EU projects. However, due to limited funding and high competition in the dedicated EU genetic resources programme, ECP/GR has been considering establishing a special task force for fundraising from other sources, through enabling ideas to be elaborated into feasible proposals.

Long-term funding provides a basis for network members to establish the network infrastructure and focus on the network programme. However, excessive long-standing external funding support can be also detrimental to network success for two reasons: first, it prevents the network to build fundraising capacity and when funds eventually dry up the network may tumble into a black hole of uncertainties. Second, external support can undermine the sense of self-reliance of the network and cooperation among members. To address this problem therefore the network should not only build fundraising capacity among members, but also ensure that members make tangible contributions in the form of membership dues, in-kind contributions, and subscription fees to newsletters or introduce other mechanisms of self-funding. Once a system of member contributions is established, the ownership of the network is measurable in terms of real investments on the part of network members.

Selected citations

On SPGRC

The long-term commitment and financial support from donor countries and ownership and financial commitment from the partner countries have been a major strength.

On INGER

Activities have been reduced due to lack of funds. This has been overcome by selecting meeting places closer to the member countries, arranging training programmes together with other relevant organizations, etc.

On INGER

Due to reduced funding, many activities can not be organised. No training activities for young scientists participating in the INGER network and very few activities for members of the steering committee.

On SAVERNET

SAVERNET does not worry about its survival. The members are free to develop joint proposals involving two or more countries under the umbrella of SAVERNET and can seek funding and jointly implement the activities for the benefit of the partners concerned.

Recently, DFID, BMZ/GTZ and USAID have supported the activities of SAVERNET. The mungbean subnetwork was supported by DFID, the eggplant shoot and fruit borer network was supported by DFID. The chilli subnetwork was supported by BMZ/GTZ. The biotechnology and mungbean subnetworks were supported by USAID. We expect the other subnetworks for the region to follow the same pattern.

On EURISCO

With relatively small investments, major impacts on the development of national PGR inventories could be achieved which would have never been possible without this project and this network of focal persons.

Extending the scope of activities from typical genetic resources-related subjects such as *ex situ* conservation and *in situ* management to development issues, including poverty alleviation and commercial breeding, tend to maximise the network's success at raising funds with donors. Donors

appreciate this type of programme as it links plant genetic resources more strongly with users, incorporates both short-term and long-term objectives, and provides visible returns on investment. This also considerable widens the scope and number of potential donors financing plant genetic resources networks, and will include funding agencies that typically only provide support to poverty alleviation projects, as well as funding agencies from the private sector. LAMP and its successor GEM in the USA are the only known examples of successful public-private sector collaboration in an international plant genetic resources network. Collaborative public-private pre-breeding activities demonstrated in these networks may be used in other regions and crops as well, although such efforts will succeed only for networks focusing on crops with a substantial commercial interest behind them.

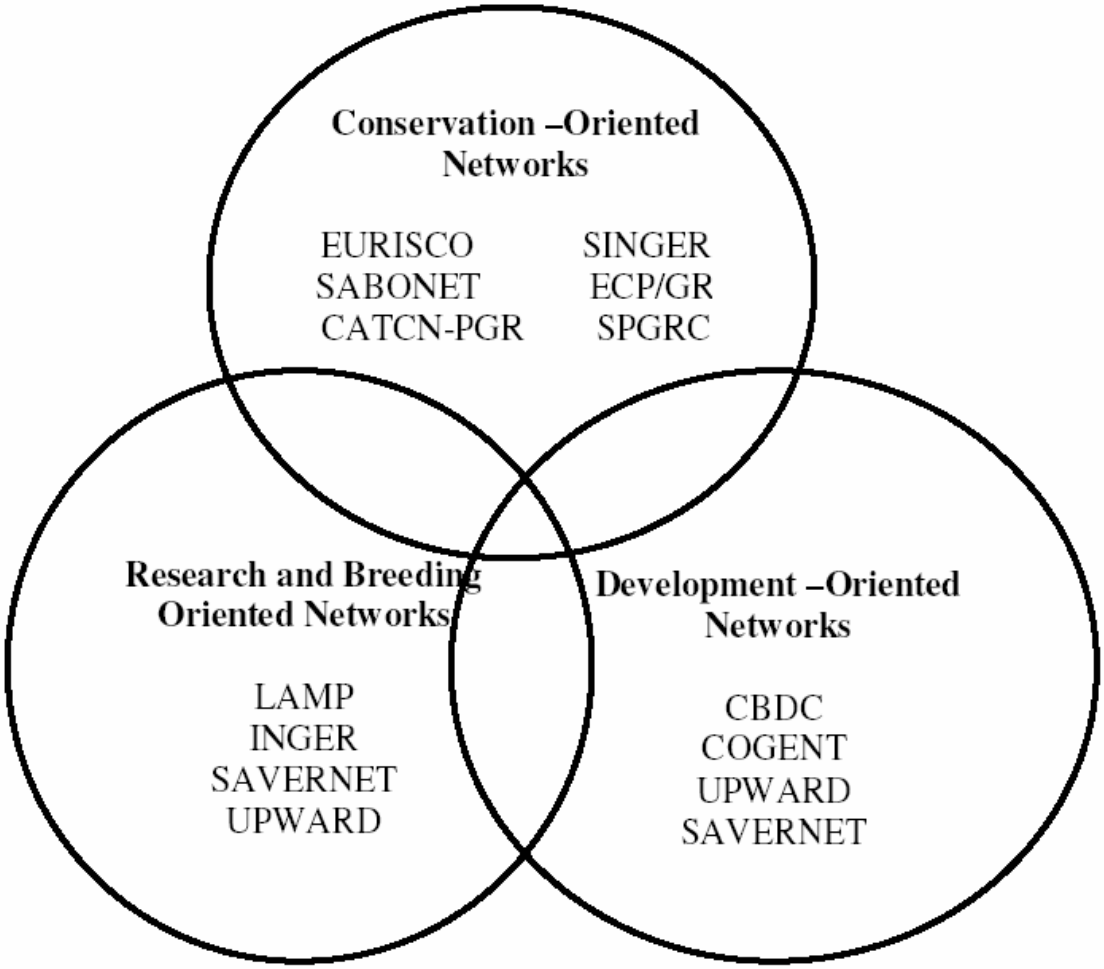

Figure 2. Scope of PGR Networks

COGENT has been successful in its own way by similarly broadening the focus of research to include poverty alleviation and in forming, with help of CGIAR, the Coconut Support Group to foster donor support. Similarly, SAVERNET has been successful in linking plant genetic resources with extension agencies and farmers through on-farm trials. UPWARD demonstrates that successful fundraising is feasible even when focusing on such marginal crops like sweet potato. Also, CBDC and SPGRC experiences requests from donors to clarify how their activities contribute to community development.

3.7 Ownership of network

Ownership of network appeared hard to measure directly, and is a highly subjective but critical criteria. In the framework of this analysis informants were asked after their opinion, and some of these

opinions are listed below. From the response it appeared that different stakeholders and different countries may experience various degrees of ownership.

Selected citations
On ECP/GR
The Steering Committee is made up of people who believe in the network and who are able to convince their governments to become members of the Programme. Consequently, they feel simultaneously owners of and responsible for the success of the Programme.
On SPGRC
The sense of ownership by network members is strong; the SPGRC centre is controlled by the partners through various mechanisms.
On ECP/GR
The interactions between genebanks seem to be good; however, the relation with other stakeholders seems not always to be present. This is at least true for linkage between the network and the private sector.
On SPGRC
Development of institutional linkages with civil society and farmers organizations on specific issues for PGR conservation, on-farm improvement and use of local knowledge systems needs to be strengthened.
On CATCN-PGR
There is a low degree of involvement of representatives of farmer communities in the network activities and NGOs and the private sector in general.
On SABONET
My SABONET experience has taught me that regional networks are complex entities to run because different conditions and experiences exist from country to country.
On COGENT
Lack of political support is a weakness especially by member country governments which have historically provided low priorities to coconut research even in big coconut producing countries. High priorities are normally given to food crops.
On LAMP
A strong sense of ownership and political support has resulted in in-kind contributions made by the member organizations.
On INGER
NARS partners have a sense of ownership on the network and contribute their varieties and breeding lines to the network. INGER is an integral component of their varietal improvement programs and promising materials identified are channelled into their national testing programmes and/or crossing work.
On UPWARD
Whatever activity is undertaken is owned by the network members. This is a deliberate strategy.

3.8 Internal resources/inputs in-kind

Flexible systems for in-kind contribution will assist members and member countries with a different development background to participate in the network. These also promote member initiatives and leaves room for choices on specific activities within a wider framework of priorities. Payment of membership dues reinforces the membership to engage in the functioning of the network as in the case of ECP/GR and SPGRC, but few other networks have yet introduced such a system. In the case that countries are not able to pay dues in cash to the network, flexible options for in-kind payment may be introduced, such as in ECP/GR. Member dues of ECP/GR are based on the UN General Assembly Assessment rate, which considers gross national product, debt burden and other criteria. However, in the event that countries cannot pay cash ECP/GR has introduced accounting procedures for in-kind contributions by allowing countries to pay the local costs of organizing network meetings in lieu of paying membership dues. A few other self-funding mechanisms are noted in networks, including introducing fees for training, newsletters and materials. Training in UPWARD, for example, has become a profitable activity, credits from which are deposited in a trust fund and in turn used to

support programme activities in the network. INGER is considering charging members for sending seed packages. In general, it is fair to say that budget constraints have seriously hampered a system of inputs in-kind to spread to more networks.

Selected citations
On ECP/GR
Networks strongly depend on the input and engagement of individuals. For a sustainable functioning of a large network as ECP/GR ways have to be found how to integrate these individuals into the organizational structure of a network without killing the personal initiative.
On UPWARD
While co-investment by network members is ideal, the reality is that these individual member organisations are facing serious constraints, especially those in the government sector.

3.9 Internal communications

Internet services have dramatically changed the need for information services provided by the network and have increased the expectations regarding visibility and transparency amongst users and donor agencies. In a world where interconnectedness is increasingly important, network performance may be determined by the quantity and quality of information services provided by the network. Such development is not (or not yet) apparent in the networks. The quality of web content and information exchange varies considerable among the networks. Except for LAMP/N-PGR and SAVERNET, all networks have a proprietary website on which objectives and priorities of the network are explained, publications and newsletters mentioned (often in downloadable form) and where applicable links to databases developed by the network are published. Whereas most IPGRI hosted networks have well established websites, ECP/GR provides added transparency by publishing the agenda and all minutes of major working group meetings and steering committee meetings. Such information services may provide extra support, and are evidently cost-effective, but apparently are not crucial to the success of the network. More important than electronic services are quality workshops and face-to-face meetings which substantially contribute to a sense of community generating pro-activeness among the members. With improved internet communications, there is a tendency to reduce the number of meetings to save on costs. Some network members regretted this developed and indicated that this would lead to reduced ownership in the network, and suggested to find a good balance between on-line and face-to-face meetings.

Selected citations
On EURISCO
A lesson from the EPGRIS project is that activities only happened because people were planning to meet to report about these activities.
A stronger focus on training and capacity building and as mentioned, ensuring regular face-to-face meetings of the focal persons would represent major improvements.
On UPWARD
Information exchange using the internet can facilitate effective networking operations. It can also lessen operational costs. But face-to-face meetings are still essential for a functional network; nothing beats a handshake in building consensus.

Nearly all networks experience some degree of language barriers which affect the level of communication with the coordinating unit and in-between members, and necessitate continuous translation. Language barriers were especially mentioned in networks like CBDC, and SABONET, but evidently are present in most networks. Some networks, such as COGENT, have attempted to overcome major language barriers through establishing regional sub-networks, other networks tend to split de facto in sub-networks according to language groups.

3.10 Impact beyond objectives: network synergies

A major network impact that is often not planned or foreseen is the impact on the functioning of other networks. Such impact may be obtained through synergistic partnerships. These partnerships can add substantially to the effectiveness of the network co-ordination unit and network results. Partnerships can have two different forms:

- Partnerships with an umbrella organisation, providing support to the network co-ordination unit in varying ways but in particular to the secretariat, that have been dealt with under 3.5 above;
- Network-to-network collaboration, providing support in the form of coaching such as between young and mature networks, and/or in a complementary position exchanging expertise and know-how.

Partnerships with host organisations that have similar or related objectives and shared interests occur regularly, and have been formalised to various degrees, as highlighted in this analysis (see chapter 3.5). In addition to partnerships with host organisations, synergistic network-to-network partnerships can be both beneficial and cost-efficient. Such partnership may contribute to critical exchange of expertise and technical and management experience, and avoid unnecessary duplication of research programmes, germplasm conservation and information management. Examples of good network-to-network partnerships are the cooperation between SINGER and ECP/GR assisting the EURISCO network in building and hosting the European germplasm database. Other examples are partnership activities between ECP/GR, GRENEWECA and EAPGREN in the areas of policies and informatics. There are many examples of network spin-offs using the protocols and experience of one network to continue or build new networks. For example, GEM and LAMN-PGR have build on the existing network collaboration and experience in the predecessing LAMP network. Many networks have some form of partnership with other networks, but at a time when collaboration is vitally needed, even limited partnerships may add to the strength of a network and should be sought actively.

For IPGRI as host institution, ECP/GR was a major example to promote regional collaboration in genetic resources. It set the stage for EUFORGEN, and played a key role in establishing the EU programme on genetic resources that contained openings for participation from non-member countries of Eastern Europe.

Lessons learnt from ECP/GR also influenced the work of other CGIAR-facilitated networks, amongst these COGENT. The Swiss Agency for Development Cooperation used lessons learned from ECP/GR to apply them to other SDC-funded networks in East Asia and the Himalayas.

The experience of the CBDC programme resulted in the development of new networks active in the area of on-farm management of genetic resources (i.e. BUCAP and PEDIGREA) that could benefit from the (positive and negative) experiences of CBDC. Likewise, the experiences of the CBDC programme are shared with other partners in the context of the Fund for Sustainable Biodiversity Management (e.g. IFOAM, Pesticide Action Network, GRAIN, etc.).

Finally, network-to-network effects also develop because some network members are also members of other PGR networks, and serve as obvious information exchange channels. Such crosslinks exist in particular but not exclusively between regional networks and crop networks.

A matter of concern to many plant genetic resources networks is the increasing negative impact of the national and regional legislation, such as IPR and plant quarantine rules, on the free exchange of germplasm, thus threatening the effectiveness of the networks. Networks with a primary focus on germplasm exchange such as INGER, COGENT and LAMP/N, including GEM, feel very much affected by this development. The introduction of Material Transfer Agreements has thus far been able to take away some of the initial reservations, but changing national and global legislation remains a major challenge to many PGR networks, and consensus on MTAs has appeared difficult to achieve.

Selected citations
On LAMP
Difficulties due to different laws about germplasm in the member countries of the network form a weakness of the network. I think that the big problem for the network is the difference in approaches towards germplasm exchange (and germplasm data) across the countries. For a majority of countries the signing of an agreement to the network therefore took a lot of time.
On INGER
In China we have set up a China national INGER network in which 13 institutions participate with many participating scientists. I am the national coordinator responsible for all INGER activities in China, including organizing workshops, helping germplasm exchange, collecting results on INGER research, sending information to participating SINGER scientists, and helping participating institutes to identify funding opportunities.
On SINGER
SINGER has created a solid network of experts and created key alliances with non-traditional partners within member's institutions. This applies in particular to IT departments as well as non-genebank sectors such as breeding and bio-informatics experts.

CHAPTER 4: SYNTHESIS

4.1 On the subject matter of PGR networks

Networking in the field of plant genetic resources almost invariably involves

- the exchange and/or distribution of germplasm, including joint characterization or evaluation, and/or
- the exchange of related information and the development of shared sources of information/databases.

In addition, some but not all networks have a strong focus on training and capacity building.
Plant genetic resources represent an actual or potential use value and an economic asset. The recognition of the value of plant genetic resources by policy makers has resulted in various policy arrangements at the national, regional and global level that strongly and increasingly impact on the functioning of networks. As a consequence, overseeing the framework of agreements under which a network operates, and where possible adapting these agreements according to needs, has become a vital element of network operations. From mainly technical organisations, plant genetic resources networks rapidly develop into organisations with a dual nature, facilitating collaboration at the technical level and creating the policy conditions for such technical exchange. Figure 3 visualizes the perceived dual nature of plant genetic resources network operations, distinguishing a production cycle and a decision-making cycle.
In order for networks to be successful, they need to be successful in both types of activities.

4.2 Short reflection on the study set-up

This study focussed - as requested - on the success factors of a number of networks. Since networks analysed were generally perceived as rather successful, it comes as no surprise that in the analysis most networks scored quite high on the success factors investigated, and therefore discrimination between the individual networks on success factors scores appeared limited. This rendered it more difficult to measure the relative weight of individual success factors on the overall success of a network. However, an alternative study approach would not have been feasible. It is unlikely to successfully extract information on weakly functioning networks.

Nevertheless, another helpful insight in the functioning of networks is offered by the effects of time. Several of the networks analysed that were the subject of case studies reported here indicate that the network underwent changes in objectives and or modes of operation, and that such changes or

adaptations may even be essential for the longer-term sustainability of the network. These networks have gone through successive stages with differing success (ECP/GR, UPWARD, CBDC), and some have even formally ceased to operate and have been replaced by new networks (e.g. LAMP).
New forms of operations were often intended to correct or circumvent weaknesses in the original network structure, as well as attempts to address new tasks and challenges. Analysing subsequent stages of a single network therefore partially replaced comparing between individual networks.
As indicated in literature on network functioning, networks should be conceived as dynamic organisations, and the more successful networks are likely to be those that do adapt effectively to changes in the needs of their partners and in their environment.

Finally, as explained below, a strong interaction between success factors generally exist, and no successful network can afford to neglect one of these selected success factors. This makes attempts to come to a ranking between the selected success factors less meaningful.

4.3 Success factors: the initial questions of chapter 2 revisited

The objectives of conservation and utilization of plant genetic resources and sharing the benefits thereof can only be reached through collaboration, and from the many activities and results reported in this study networks appear to be a much more efficient form than bilateral collaboration arrangements can ever be. Network partners directly communicate and collaborate with each other in varying groupings under a common set of conditions set by the network. It is the subject matter (genetic resources and the accompanying information, scattered as these are over many countries and stakeholders) that renders the network an almost unavoidable and essential instrument to attain the objectives. An increasing role of bilateral arrangements may even be seen as potentially disruptive, in particular where the objective of benefit sharing is involved and transparency and mutual trust may be lost with the rise of unpublished bilateral arrangements.

A substantial number of the analysed networks does not only focus on information exchange, but also allows exchange of genetic materials, and involves research and breeding activities. Task sharing regarding conservation of genetic resources on behalf of the other partners in the network appears still limited. Given the small number of the analysed successful networks that have undertaken joint conservation, a clear correlation with the success of the network in general is not apparent. In other words, joint conservation activities do not necessarily represent a higher or more effective level of network functioning.

The networks analysed all provided tangible outputs whether in the form of publications, trainings, characterised and evaluated germplasm, or joint databases. To what extent outputs were produced in line with the planning could not really be analysed in the scope of this study, limiting the options to objectively measure the effectiveness (major plans realised) and efficiency (against projected costs) of the networks. Although the realisation that networks form an essential strategy in the area of plant genetic resources leads to the conclusion that the network outputs would be difficult to obtain under alternative arrangements, this does not guarantee that funds have always been optimally spent. In fact, continuous or recurrent priority setting processes in the networks indicate that adjustments are regularly made, including on optimal budget spending.

The level and type of representation of partners in steering committees or other decision-making bodies appeared an issue that repeatedly surfaced. Many of the analysed networks seem to have solved this problem by the establishment of technical committees or the organisation of other discussion platforms in addition to formalised steering committees, thus securing both technical and policy-related inputs, and safeguarding policy support in the member countries.

Leadership appeared of major importance in the functioning of the analysed networks, but the type of leadership varied. In some cases leadership was mainly based on the personal capacities of a coordinator, whereas in other cases this derived from the dominant role of a partner institute or umbrella organisation. Obviously, such dominance did not negatively influence the success of the

network per se. Whereas a strongly dominating leadership may reduce the feeling of responsibility for the functioning of the network, obviously this does not necessarily reduce interest in participating in network activities, since the latter is directly correlated to the perceived benefits. Such position may then be regarded as a passive sense of ownership, or ownership in a narrower sense: a partner has stakes in the network but willingness or capacity to invest in the network functioning may still be limited.

4.4 Success factors in their context: internal relations

This report has analyzed a number of networks that are or have been perceived as successful. It has made an attempt to distil from the acquired information which factors determine the successfulness of a network. A number of factors have been discussed above and an overview has been provided of the degree by which the networks analyzed have been successful in these aspects. Naturally, these factors do not operate independently from each other, but feed into or otherwise influence other factors. This synthesis tries to elaborate the major relationships between the important success factors.

To effectively collaborate in the framework of a network, *clear objectives* need to be set. Formulation of the objectives is certainly important at the start of a network, but objectives once set also need regular revisiting to be able to adjust to changing needs. A needs assessment should lie at the basis of the process of formulating the objectives. In this stage, a decision on the openness or closedness of the network is central. The process of formulating the objectives contributes to team working and consensus building in an early stage of network formation.

In addition, sufficient human and financial resources should become available. Such resources can be generated by *external funding* from other parties than the partners in the network, by *financial contributions* from the partners, and by access to human resources made available by the partners as *inputs in-kind*.

In allowing focussed network activities, the formulation of objectives and the securing of sufficient funding come together.

Network outputs may be various but should have obvious value for the network partners. Outputs may concern the seeds (or plants) and include regeneration, characterisation, evaluation, reintroduction and other use of genetic resources of common interest to the network, but may also concern improvement of genebank management or on-farm management practices, the establishment of common databases, and further research and training. The balance between these elements varies from network to network, depending on its objectives and development phase, and no general recipe can be given. Certainly, network outputs function as a major pull factor to potential partners and active individuals. The more obvious the benefits to the partners in the network are, the more likely it is that inputs in-kind and/or financial contributions from the partners for network activities will become available. Whether network activities are geared optimally to obtaining direct benefits for the partners depends on clear objectives as a basis as well as on a transparent and regular *priority setting process* in the network in which all partners can equally participate. An effective priority setting mechanism results in partner inputs and in a *sense of ownership* on the network activities and outcomes.

The better network objectives and results fit into the global priorities formulated in the FAO Global Plan of Action on PGRFA and the shared objectives of the Convention on Biological Diversity and the International Treaty on PGRFA, the easier it is to obtain *political backing* and external financial support from bilateral and international donor organisations.

4.5 The importance of fundraising

From network experiences it is clear that the success and sustainability of the network is highly dependent on the continuous availability of sufficient resources, and that being an effective network in a technical sense does not automatically result in political recognition and external funding, and these

should not be taken for granted. *Fundraising* appears to be an essential activity and needs continuous attention, not just at the start of network operations, or near the end of a project phase, but continuously, and not only for a given set of minimum activities but also to expand the number and level of network activities. Active and well-planned lobbying forms a central element of fundraising, and training to increase the fundraising skills of network individuals is an investment that pays back. Fundraising should explain the impact of plant genetic resources network outputs on conservation of biodiversity as well as on community development and breeding programmes, where appropriate and depending on the type of activities for which funding is sought. Therefore, a proper mix of technical managers and more socially oriented active network individuals is a great benefit. Closely linked to fundraising is the issue of visibility of the network. In particular donor funding, but also funding from national governments is hard to obtain if the activities and benefits of the network are not well publicised. A well-organised and updated web site and brochures presenting the network and its outputs to potential funding agencies should receive the necessary attention. In this sense, little distinguishes a network from any mainstream project activity that depends on external inputs.

4.6 Support functions as hidden essentials

In overseeing the priority setting process, in organising the work and facilitating the production and distribution of results, and in reporting to funding agencies and partners, the *network management* (usually a *secretariat* and/or a *steering committee*) plays an essential role.

All successful networks have a functional steering committee. The steering committee should provide legitimacy to the network operations and is accountable to donors and partners on the network operations. The steering committee should have members from the partner organisations with knowledge on genetic resources, strategic capabilities, and with sufficient time to devote to the network, and members should be functioning in sufficiently influential positions in their home country to request political support for network operations from within their country.

The secretariat may profit from an *umbrella organisation* that provides services to the network, but this is not an absolute prerequisite for an effective functioning of the network. If necessary one of the partner organisations can fulfil this role. The umbrella organisation may provide vertical integration in other networks and global platforms, so that the network operations effectively contribute to reaching objectives at a higher integration level.

The person(s) fulfilling the role of secretariat has/have a strong influence on the functioning of the network. Whereas they should provide leadership, they should not be dominant, since this has a negative effect on the sense of ownership and/or the level of contributions from the partner organisations. The profile and responsibilities of the secretary or coordinator should be clearly described as well as those of the Steering Committee.

Any effective network needs active individuals in addition to the secretariat to organise the network and its activities. Such individuals may be members of the steering committee or of technical advisory committees and/or members/employees of partner organisations. Different individuals may address technical issues or policy and strategic issues, but both types of issues need attention. Any network needs several ‘hubs’ (points of exchange of information and ideas) and ‘drivers’ (initiators) to prevent it from being too vulnerable to personal changes and to make it robust and sustainable.

Finally, efficient *internal communications* may help the functioning of the network, but the case studies provided do not support the conclusion that frequent e-mail exchanges are absolutely essential for the success of a network. Cultural influences may play a major role, some regions being more open to decision-making processes that are concentrated in time, that may even result in temporary delay and depend on physical meetings, than other regions. Nevertheless, efficient access to e-mail and Internet facilities is an increasing demand, and can be seen as a service that the network should supply to its members, if not yet in place. A word of caution here is that no effective network can entirely depend on electronic forms of communications and regular physical meetings (workshops, steering

committee meetings, other face-to-face meetings) are absolutely essential to build commitment and trust, in particular for the technical staff in the network. Where e-mail communications play a major role, this is almost invariably between individuals that do meet at other occasions or have a long-standing relationship based on earlier physical meetings.

4.7 Weak points common to several successful networks

Weak points mentioned by strong networks partly follow from the analysis above.

They include
- the available level of funding and the fundraising capacities of the network,
- the way by which members are represented in a steering committee (*ex officio* members are not always effective),
- the number of active individuals, and
- the level of activities of individuals in the network.

Furthermore, a matter of concern to many networks is the increasing impact of the Convention on Biological Diversity and national or regional legislation based on the principles of the Convention. In contrast to its objectives, the implementation of the CBD has tended to endanger or slow down the exchange of genetic resources and/or related information, thus threatening the general effectiveness of network operations.

4.8 Indicators

Whereas this report focuses on success factors, such factors need translation into indicators to be able to measure the effectiveness of networks for the various success factors, whether this serves an external evaluation or is part of a regular self-assessment of a network. The value of such indicators is not in comparing networks with each other, but is helping to set targets and to measure success in individual networks.

The following major indicators are proposed:

- Available funding

Funding includes both funding from partner organisations or member countries in the form of membership fees, funding for joint network projects, etc., and external (donor) funding for network operations, whether specified or not. Major aspects are the level and continuity of funding, whether from a single donor or several successive donors.
Available funding is a measure for the political support, and the success of the steering committee, the network coordinator, and the number of active individuals in the network. *Political support* in turn, is a measure, amongst others, for the clarity and the appropriateness of the objectives.

- Inputs in-kind provided

Inputs include staff time made available for the functioning of the network as well as the provision of facilities to the network, including laboratory facilities, computer hardware and software for common databases, and meeting and housing facilities for workshops. Staff time may involve technical staff and support staff, e.g. for the functioning of a secretariat or the organisation of a workshop. Travel costs might also be borne by the partners. Each of these contributions might be formally agreed and clearly visible, or informally provided and not well represented in the books.

The level and quality of inputs in-kind is a measure for the *sense of ownership* in the network, and more directly, the benefits that partners derive from network outputs, but also for the political support that allows for such inputs in-kind.

- Number of active partner organisations and active individuals

These indicators provide insight in the robustness of the workshop, and the balance between partners in the network. To make use of such indicator feasible, a definition should be developed of a PGR network activity, and of a minimum threshold indicating involvement of a partner organisation and/or active individual. Obviously, such minimum level is strongly network-dependent and time-bound, and can only be formulated at the network level.

This indicator reflects the number of *network activities*, as well as the quality of the *network coordinator/secretariat*.

- Number, type and quality of joint outputs

Whereas the number of independent network activities forms an indication for the viability of the network, the type and quality of the network outputs form a major indication for the network effectiveness. The type of output can be measured against the network objectives, and the quality against the novelty and use of the results. Outputs can be time-bound and/or project-related, such as the number of regenerations and/or evaluations carried out in the framework of a network, the number of genetic resources exchanges (diversification of GR exchanged) and the number of partners involved in such exchanges, but also include more continuous operations resulting in an up-to-date web site, and or common databases.

This indicator also reflects amongst others, the level of facilities provided for by individual partner organisations and the *umbrella organisation*.

Secondary indicators may involve the functioning of the secretariat reflected in the number of communications with the partners and with donor organisations; and the functioning of the steering committee, related to the number of meetings of the steering committee, the number of its members and of partner organisations participating.

In all cases, however, these indicators need to be interpreted for each particular network, and this can only be done within each network. In particular, such tool should accommodate self-assessment of network in various phases of development, e.g. in an establishment phase (up to four years), a growth phase (5 – 10 years) and a consolidation phase (beyond 10 years).

4.9 Major conclusions

Some properties characterize each of the networks analyzed or are mentioned as essential characters of effective networks by the contact persons approached in the framework of this study.

<u>Subject matter and organisation</u>

From mainly technical organisations, plant genetic resources networks rapidly develop into organisations with a dual nature, facilitating collaboration at the technical level and creating the policy conditions for such technical exchange. As a consequence, networks exhibit a dual type of operations that can be distinguished in a production cycle and a decision-making cycle.

To effectively collaborate in the framework of a network, clear objectives need to be set. Formulation of the objectives is certainly important at the start of a network, but objectives once set also need regular revisiting to be able to adjust to changing needs. A needs assessment should lie at the basis of the process of formulating the objectives. Indeed, the use of effective tools for needs assessment and priority setting have resulted in clear objectives in all networks. In this respect, bottom-up participatory processes for setting objectives and priorities are common to all the networks, either through Steering Committees comprising of national or member organisation representatives, and/or through a system of regular workshop meetings and consultation visits.

Networking in the field of plant genetic resources almost invariably involves

- the exchange and/or distribution of germplasm, including joint characterization or evaluation, and/or
- the exchange of related information and the development of shared sources of information/databases.

In addition, training collaborative research programmes form a substantial activity in most of the networks and provide crucial *pull* factors for members to become active in the network.
The more obvious the benefits to the partners in the network are, the more likely it is that inputs in-kind and/or financial contributions from the partners for network activities will become available.

Network success seems not directly related to a particular organisational model but is rather associated with the responsiveness of the network to react to different environments and member needs. Such responsiveness necessitates the establishment of a clear organisational structure with effective member participation in the network's priority setting process.

All successful networks have a functional steering committee. The steering committee should provide legitimacy to the network operations and is accountable to donors and partners on the network operations.

The level and type of representation of partners in steering committees or other decision-making bodies appeared an issue that repeatedly surfaced.

In addition, all networks in this study have a secretariat and a full-time network manager employed to coordinate the activities in the network at both the strategic level and the output level. A high level of communicating skills, strong support towards network members and effective linkages with the donor community are elements attributed to a network coordinator providing success to the network.
Leadership appeared of major importance in the functioning of the analysed networks, but the type of leadership varied. In some cases leadership was mainly based on the personal capacities of a coordinator, whereas in other cases this derived from the dominant role of a partner institute or umbrella organisation.

Umbrella organisations contribute to critical expertise and resources to assist the network in carrying out its mandate, such as office space, materials, core funding for staffing and meetings, and in some instances serve in gap-filling when funds temporarily dry up, and sometimes are involved in direct fundraising. Moreover, they provide a platform for the network to function as a platform for regional and global affairs on the implementation of the FAO GPA, and may warrant network sustainability by slowly building regional and global support and in donor relations, which evidently is crucial as funds tend to dry up.

Any network needs several 'hubs' (points of exchange of information and ideas) and 'drivers' (initiators) to prevent it from being too vulnerable to personal changes and to make it robust and sustainable.

In a world where interconnectedness is increasingly important, network performance may be determined by the quantity and quality of information services provided by the network. Such development is not (or not yet) apparent in the networks. The quality of web content and information exchange still varies considerable among the networks.
The issue of visibility of the network is also important in the light of funding. In particular donor funding, but also funding from national governments is hard to obtain if the activities and benefits of the network are not well publicised.

Efficient access to e-mail and Internet facilities is an increasing demand of network members as well, and can be seen as a service that the network should supply to its members, if not yet in place. Where

e-mail communications play a major role, this is almost invariably between individuals that do meet at other occasions or have a long-standing relationship based on earlier physical meetings.

Although the realisation that networks form an essential strategy in the area of plant genetic resources leads to the conclusion that the network outputs would be difficult to obtain under alternative arrangements, this does not guarantee that funds have always been optimally spent. In fact, continuous or recurrent priority setting processes in the networks indicate that adjustments are regularly made, including on optimal budget spending.

Network financing

Sufficient human and financial resources should become available. Such resources can be generated by *external funding* from other parties than the partners in the network, by *financial contributions* from the partners, and by access to human resources made available by the partners as *inputs in-kind*.

Fundraising appears to be an essential activity and needs continuous attention, not just at the start of network operations, or near the end of a project phase, but continuously, and not only for a given set of minimum activities but also to expand the number and level of network activities. Active and well-planned lobbying forms a central element of fundraising, and training to increase the fundraising skills of network individuals is an investment that pays back.

Fund raising requires specific skills and creativity to develop an idea into a sound donor funding proposal. In addition, it requires a great deal of time and resources. The tendency within the networks is therefore to rely heavily on the permanent staff of the coordinating unit, especially the network coordinator, to elaborate proposals and keep in touch with potential donors. In the event that the network relies heavily on external funds, the skills of the coordinator in performing these tasks may to a large extent determine the success of the network.

However, the network should not only build fundraising capacity among members, but in order to complement and compensate donor funding, should also ensure that members make tangible contributions in the form of membership dues, in-kind contributions, subscription fees to newsletters or other mechanisms of self-funding. A system of member contributions enables measurement of the ownership of the network in terms of real investments on the part of network members, whereas without such direct contributions ownership of network appeared such measurement may be highly subjective but critical criteria. Flexible systems for in-kind contribution will assist members and member countries with a different development background to participate in the network.

Other conclusions

- In addition to partnerships with host organisations, synergistic network-to-network partnerships can be both beneficial and cost-efficient. Such partnership may contribute to critical exchange of expertise and technical and management experience, and avoid unnecessary duplication of research programmes, germplasm conservation and information management.

- Weak points mentioned by strong networks partly follow from the analysis above. They include
    - the available level of funding and the fundraising capacities of the network,
    - the way by which members are represented in a steering committee (*ex officio* members are not always effective),
    - the number of active individuals, and
    - the level of activities of individuals in the network.

- A number of these success factors have been translated into measurable indicators, in particular for purposes of internal network planning and evaluation and for the setting of network targets.

The indicators, in turn, can thus be incorporated into a tool supporting the self-assessment of plant genetic resources networks.

- **Networks do not have to survive forever to be highly successful. They may simply cease to exist or be followed-up by a new and different network. The formulation of success factors, the choice of indicators, and their incorporation into a tool, should reflect this.**

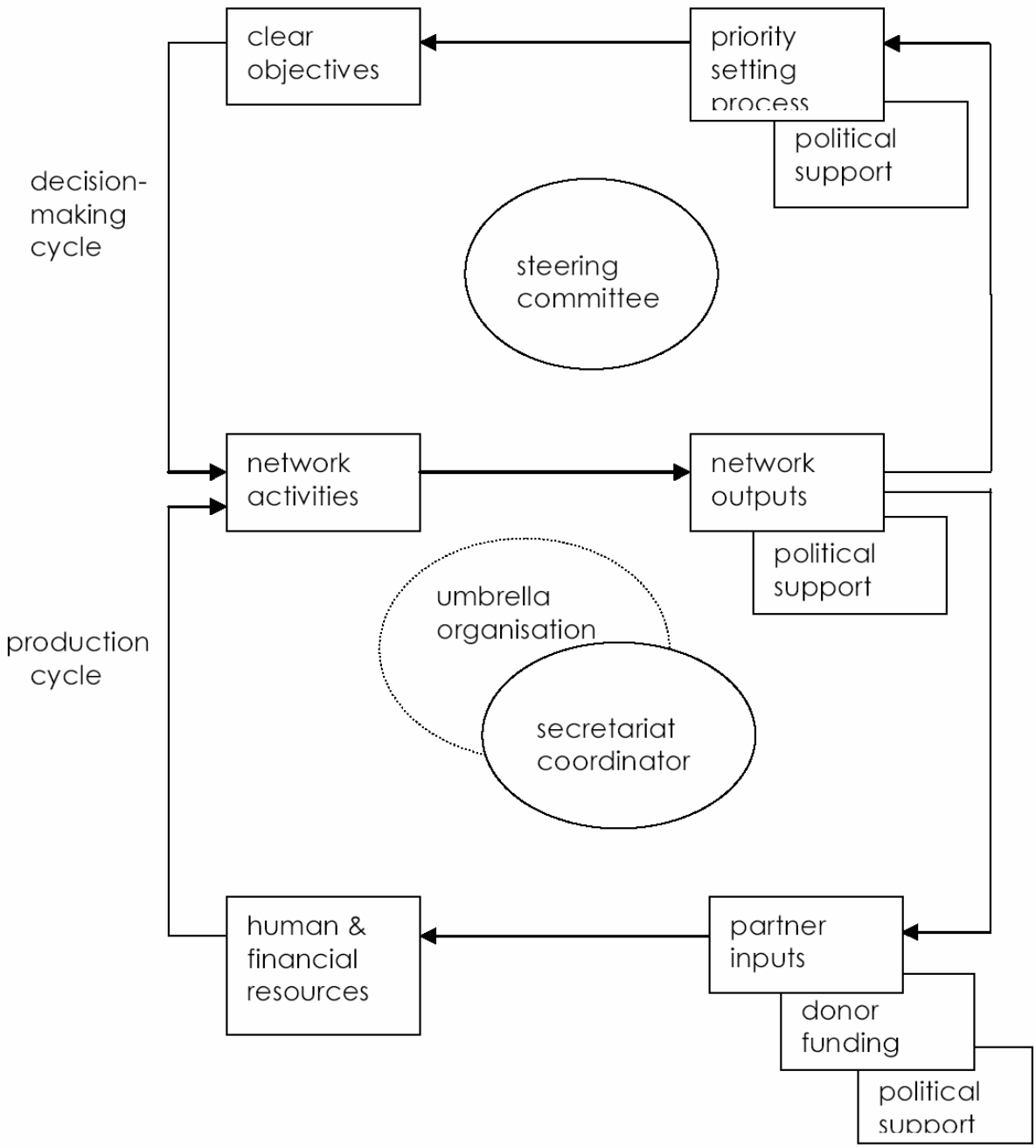

Figure 3. Relationships between success factors

CHAPTER 5: REVISED SELF-ASSESSMENT QUESTIONNAIRE FOR PGRFA NETWORKS

This is a self-assessment instrument for PGRFA networks as part of an analysis of effectiveness of PGRFA networks, commissioned by FAO. The instrument has been derived from an earlier self-assessment questionnaire developed by FAO en IPGRI jointly. In revising the original questionnaire, the findings of this study on the effectiveness of PGRFA networks have been integrated. Moreover, the revision aimed to convert this document into a self-assessment instrument for internal use mainly. This current instrument does not intend to extract information from the network for use by other parties, but rather support networks in reflecting on their effectiveness. The instrument is intended for use by all stakeholders in a PGRFA network. Users of this questionnaire may find it helpful to make use of Figure 3, in chapter 4, at page 49 of this report.

1.0 Objectives and priority setting process

1.1 Are the purposes(s) and objective(s) of the network clearly defined and agreed upon by members?

1.2 Is there a "founding" document that describes the purpose(s) and objective(s)?

1.3 Does the network website clearly present the objectives and "founding" document?

1.4 Has a regular priority setting process based on the objective(s) been implemented?

1.5 Is there a process in place by which the objective(s) are revisited to reconfirm their appropriateness? Does this involve members and stakeholders?

1.6 Has the network reached and involved all appropriate members?

1.7 Which of these aspects need attention to improve network functioning?

2.0 Type of activities

2.1 Do the activities fit the set objectives and can the objectives be reached based on these activities?

2.2 Is there a plan of work that details responsibilities, resource commitments and time frames?

2.3 Is the plan of work based upon an assessment of member and other stakeholder needs and priorities?

2.4 Do network activities not only entail effective collaboration between secretariat and members but also amongst members?

2.5 Which of these aspects need attention to improve network functioning?

3.0 Outputs

3.1 Do outputs fit the objectives?

3.2 Are outputs in line with the plan of work?

3.3 Have outputs been reached in the most cost-efficient way?

3.4 Have outputs been published?

3.5 Are collaborative research projects realised on a regular basis?

3.6 Are the outputs optimally used by network members and other stakeholders in terms of information, training, materials and collaborative research?

3.7 Is a system im place to monitor and evaluate network outputs?

3.8 Which of these aspects need attention to improve network functioning?

4.0 Funding and fundraising

4.1 To what extent is network coordination funded by member dues?

4.2 How are member activities funded?

4.3 Have inputs in-kind been effectively mobilised?

4.4 If external funding and inputs in-kind are both available, are these two sources in balance?

4.5 If external funding is available, are funds optimally used for the right activities?

4.6 If external funding is available, does this secure network operations for at least two more years?

4.7 Have all potential funding sources been exhausted?

4.8 Is sufficient fundraising capacity available to the network? Is a fundraising plan available?

4.9 Which of these aspects need attention to improve network functioning?

5.0 Organisation

5.1 Are there formal agreements between network members and the network secretariat?

5.2 Do these agreements include commitments for member inputs in-kind?

5.3 Has a functional steering committee been established? Is steering committee membership optimised to allow proper functioning of the network?

5.4 Does the steering committee meet regularly?

5.5 Has a professional secretariat been established?

5.6 Have technical working groups been established?

5.7 Is sufficient leadership provided by the steering committeee, the secretariat, or other members?

5.8 Has the right balance in decision-making been reached between steering committee, secretariat and members?

5.9 Does decision-making effectively involve all members?

5.10 Do some members or sectors dominate the network, and if so, does this promote or harm reaching the set objectives?

5.11 Which of these aspects need attention to improve network functioning?

6.0 Network communication

6.1 Has a mechanism for effective e-mail exchanges been established?

6.2 Is the e-mail platform used for both administrative and contents-based exchanges?

6.3 Are electronic exchanges complemented by sufficient and appropriate face-to-face meetings?

6.4 Are face-to-face meetings regularly scheduled to allow optimal contact between network members?

6.5 Are the right persons participating in face-to-face meetings?

6.6 Is a newsletter or are other communication means used to allow for exchanges between members?

6.7 Has a proper mix of communication instruments been reached?

6.8 Are communication means such as a website and a newsletter also sufficiently geared to inform stakeholders and donors?

6.9 Which of these aspects need attention to improve network functioning?

The indicators listed in chapter 4 to monitor progress of the network are more concise and reflected in the self-assessment questionnaire according to table 12. Indicators measure some aspects of network functioning (e.g. on organisation and communication) in an indirect way.

Table 12. Relation between questions and major indicators

Indicator	Question
1. Funding & fundraising	4.1 - 4.9
2. Inputs in kind	2.3, 2.4; 4.3, 4.4; 5.2, 5.7; 6.4
3. Number of active organisations and members (robustness)	1.6; 2.2, 2.4; 3.5, 3.6; 5.7, 5.8, 5.9; 6.5
4. Quality and Quantity of Outputs	1.4, 1.5; 2.1; 3.1 – 3.8;

REFERENCES

Barabasi Albert-Laszlo 2003. Linked; How Everything Is Connected to Everything Else and What It Means For Business, Science, and Everyday Life. Publ. by Penguin Group, USA.294 pp.

Biggs S.D.1989. Resource-Poor Farmer Participation in Research: A Synthesis of Experiences from Nine National Agricultural Research Systems. OFCOR Comparative Study Paper N.3. ISNAR, The Hague, Netherlands

CGIAR. 1999. Types of Participatory Research Based on Locus of Decision-Making. SWP PGRA Working Document No.6. CGIAR, Cali, Columbia.

FAO. 2002. Progress Report on Certain Elements of the Global System For the Conservation and Sustainable Utilization of Plant Genetic Resources For Food and Agriculture. Commission on Genetic Resources For Food and Agriculture; Report of the Working Group on Plant Genetic Resources for Food and Agriculture, 2nd session, Rome, 5-7 November 2003.

Greiner L.E. 1998. Evolution and Revolution as Organizations Grow. Harvard Business Review, May-June, vol 76, Issue 3.

Kaulaugher Electra & Bert Visser. 2002. A Summary and Analysis of Existing International Plant Genetic Resources Networks. Commission on Genetic Resources for Food and Agriculture. Background Study Paper No. 16.

Watts Jamie L. 2002. One Plus One Equals three: Maximizing Participation in Plant Gentic Resource Networks. Plant Genetic Resources Newsletter, 2002, No. 130: p 28-35.

ANNEX 1: NETWORK CASE STUDIES

Approach

Following is a detailed description of the plant genetic resources networks studied. In total 15 successful networks on plant genetic resources were selected for inclusion in this study. Network coordinators of these networks were contacted by email and requested to fill in and return a comprehensive questionnaire. The first part of the questionnaire consisted of a scoring matrix and a number of open questions requesting the contact persons to provide their opinion concerning network strengths and weaknesses and other key factors involved in the network performance. The second part of the questionnaire aimed to provide input on quantitative details concerning objectives, priority setting, membership, financial mechanisms, network-to-network collaboration, and specifics concerning network outputs. This part of the questionnaire was primarily based on the self assessment questionnaire, compiled by the Working Group on Plant Genetic Resources for Food and Agriculture (FAO, Rome, Nov 2003) and consisted mainly of multiple choice questions. Finally, the coordinator was asked to make available specific documents, such as founding documents, membership agreements, minutes of recent steering committee meetings, and recent assessment reports.

Out of the 17 pre-selected networks, good response was received from 12 network coordinators. Upon receiving the coordinator questionnaires, key informants suggested by the network coordinator and by others were contacted to provide additional input using a short open questionnaire, comprising of the first part of the coordinator questionnaire. Additional discussions were held with coordinators and key informants through email, telephone conversations and occasional personal interviews to clarify certain elements of the network concerned. This together with online researched documentation provided the means to describe the networks in detail. The case studies are presented below in accordance with their scope and objectives as follows:

1. Regional Networks: ECP/GR, SPGRC, CATCN-PGR and SABONET
2. Crop Specific Networks: COGENT, LAMP, INGER and SAVERNET
3. Thematic Networks: EURISCO and SINGER
4. In-situ Oriented Networks: UPWARD and CBDC.

Moreover, in this annex limited information is provided on the pre-selected networks that were eventually not included in this analysis.

1.European Cooperative Programme for Crop Genetic Resources (ECP/GR)

The European Cooperative Programme for Crop genetic Resources Networks (ECP/GR) is one of the most complex PGR networks studied and, with the exception of INGER, the oldest network on plant genetic resources studied. The network is regarded by many as the world's most successful regional collaborative programme on plant genetic resources. It is a highly formalised, long standing, decentralized, and (almost) entirely self-financed network.

ECP/GR was established in 1980, after nearly 5 years of intense series of consultative missions and discussions involving UNDP, the EUCARPIA Gene Bank Committee, and FAO/ IBPGR (IPGRI's predecessor). The consultations resulted in the endorsement of a document outlining the objectives of the network and operational parameters of the programme by representatives from 22 European countries. From the start a self-financing strategy was adopted involving in-kind contributions of cooperating countries by inserting national activities into the coordinated regional programme. A secretariat under the aegis of FAO was initially established in Geneva, Switzerland, but moved in 1983 to IPGRI (then IBPGR) in Rome, Italy, where it has remained until now. The network has been continuously expanding. Starting from an initial 8 cooperating countries in 1980, the network now comprises of 36 countries, including Turkey, Israel and many former East block countries in Eastern Europe. A small number of countries in the region have observer status and have nominated Focal Persons to ECP/GR and sometimes are invited to working groups.

ECP/GR aims to facilitate long-term conservation and increased utilization of plant genetic resources in Europe in line with the GPA. In this effort it is guided by a set of clear objectives (see box) and a mechanism ensuring regular review and updating of objectives and priorities. A Steering Committee, consisting of National Coordinators nominated by participating countries, and invited representations of the European Commission, meets twice per five year period to decide on strategy and priorities, the general scope and progress of the sub-networks and working groups, and approves the budget.

Objectives of ECP/GR (since 1998)

- To facilitate the long-term in-situ and ex-situ conservation of plant genetic resources in Europe
- To facilitate the increased utilization of plant genetic resources in Europe
- To strengthen links between all plant genetic resources Programmes in Europe and promote the integration of countries which are not members of ECP/GR
- To encourage cooperation between all stakeholders, including NGO's and private breeders
- To increase the planning of joint activities including the development of joint project proposals to be submitted to funding agencies

Other organisations, including FAO, IPGRI, private sector and NGOs are invited as observers, mainly to the meetings of the Steering Committee. The Programme primarily operates through networks in which activities are carried out either through working groups, task forces or as ad hoc actions. The secretariat, that receives its mandate from the Steering Committee, provides necessary support in terms of coordination, hosting of the website, linkages with Central Crop Databases, hosting of the central EURISCO database (jointly with SINGER), and the facilitation of meetings.

Since 1994, ECP/GR has become *the* platform for Europe to facilitate the implementation of the Global Plan of Action for the conservation and sustainable utilisation of plant genetic resources for food and agriculture. This has further widened the network's objectives to include *in situ* conservation, an increased share of responsibilities in PGRFA and awareness campaigns.
Critical lessons were learnt in phase II through IV (1983 -1993). In an early move of strategic importance, IPGRI was chosen as the umbrella organisation to host the ECP/GR Secretariat. The objectives of the Network overlap with those of IPGRI. IPGRI as hosting organisation is fully committed to ensuring the best possible logistic support and to promote its continuation, and is often in a condition to inject additional contributions into the Network operations (funds, personnel, professional links, ideas, logistic arrangements) and to ensure the continuity of its operations during transition phases. The hosting arrangement with IPGRI has benefited the ECP/GR platform in promoting PGRFA in inter-regional cooperation, and to forge cooperation with other PGR networks, FAO, etc.

Priorities of ECP/GR (since 2003)
- Characterization and evaluation (including use of modern technologies)
- Task sharing

During Phase III, ECP/GR further experimented with a reduced profile of the Secretariat to reduce costs and initiate bottom up-activities. This, however, led to a less proactive approach, and was reversed in phase V. Such proved that an effective Secretariat and full time coordinator is vital to keep the network moving.
The present governing structure with a Steering Committee consisting of national representations was introduced in 1995, replacing the former Technical Consultative Committee. This former structure was introduced to enforce a network with decentralized power, thus ensuring improved sustainability and ownership. The Steering Committee is composed of key persons who strongly support the Programme, are able to influence the delivery of funds from governmental agencies, and can mobilize national scientists to partake in international Working Groups and other forums. On the other hand, decisions taken at the SC level empower National Coordinators with an international mandate that they can use to influence activities at the national level.

ECP/GR has become a complex network. Starting from a network with eight crop working groups, the ECP/GR is now structured into nine sub-networks (6 crop networks and 3 thematic networks), which are each coordinated by a network coordinating group (since 2004). Activities of the nine sub-networks are implemented by 22 Working Groups and Task Forces. The number of working groups signals the strong commitment to plant genetic resources in Europe. However, the management of these working groups has become difficult for the Secretariat to follow up closely.
By assigning such responsibility to Network Coordinating Groups, the Steering Committee has tried to strengthen the coordination. The success of this initiative depends on the possibility of the members to effectively dedicate their time in-kind voluntarily.
ECP/GR has been effective in engaging members firmly in the functioning of the network by introducing member fees and flexible arrangements for in-kind payment. Self sustainability was achieved effectively in Phase IV (1990-93). The annual contribution of member countries to the ECP/GR is based on equity levels, and varies depending on the country's ability to finance as determined by the UN General Assembly Assessment Rate, which considers gross national product, debt burden and other criteria. In addition to this membership fee, member countries contribute substantially in-kind by inserting national activities into the coordinated regional programme, which is one of the basic pillars of the success of ECP/GR. ECP/GR is the only network that recognizes and

accounts for in-kind contributions by allowing countries to pay the local costs of organizing network meetings in lieu of paying membership fees by attaching a fixed value to such meetings. This engages network members in providing important services to the network and involves members in planning and managing network meetings. Fundraising beyond the regular country contributions have been undertaken with mixed success by several Working Groups and ad-hoc task forces, through submission of project proposals, especially to the European Union. Fundraising activities is still a less developed feature in the network, as it is dependent on the launching of suitable calls for proposals, in particular by the EU. Structurally this weakens the programme as insufficient availability of external funds often result in ideas and proposals which cannot be implemented. Thus far, the initiative is left to the discretion of the Secretariat on the basis of the existing possibilities.

A weak factor of ECP/GR is the capacity of the network to maintain all participants active and interested. Quality and quantity of output of the different working groups and network task forces vary considerably depending on the topic and the input of the chairman elect. The addition of new countries to working groups apparently creates different levels of know-how, resulting sometimes in time-inefficiencies and less output. With communications improving, the trend has been to decrease the number of meetings, and activities tend to be low between meetings. ECP/GR is typically a network dominated by government researchers, curators and information technologists. Interaction with private breeding industry, NGOs and international experts are actively stimulated by the Secretariat through invitation of external observers to working group meetings and seminars. Some working groups nevertheless tend to favour internal contacts, sometimes alienating new members.
Network support for participation in working groups is dependent on the level of member dues, which does not add to a sense of ownership of the least developed member countries. Thematic network groups like on-farm conservation have difficulties to coordinate activities at national level because of differences in orientation between participants in the scientific field and the pragmatist field (NGOs). Notwithstanding these weaknesses, to date ECP/GR has produced some impressive outputs. These have been beneficiary for both members of the network as well as for users of germplasm and information thereof. It has contributed to maintenance of an open and continuous access to germplasm and the related information. Based on the work of the crop-oriented activities (inventorying and characterisation), the network has been instrumental in the establishment of nearly 50 Central Crop Databases (CCDB's), which are managed as 'input in-kind' to the ECP/GR by a total of 32 institutes from 19 countries. Increased standardisation and publication of some CCDB's on the internet, and EURISCO have made the information on germplasm more accessible to users. Training activities are generally low and is not considered a core activity in the network. Transparency of the ECP/GR network is substantial, evidenced by the publication of database links, progress reports, news files and meetings minutes on the internet site of ECP/GR, which has greatly contributed to the sense of ownership. ECP/GR has been the locomotive for IPGRI as the host institute to promote regional collaboration in genetic resources. It set the stage for others (e.g. EUFORGEN, EAPGREN, GRENEWECA) and played a key role in implementing the EU Programme on genetic resources. Lessons learnt from ECP/GR also influenced the work of other CGIAR networks (such as COGENT) and were instrumental to regional PGR and agro-biodiversity networks such as that of SDC in the Himalayas.

2. SADC Plant Genetic Resources Centre

The SADC Plant Genetic Resources Centre SPGRC was established as part of a twenty year project in 1989 by Memorandum of Understanding of the SADC Member States and the Nordic Council of Ministers to start work on plant genetic resources in the Southern African Region. The objective was to ensure short and long term conservation of the germplasm of crop and wild plant species for immediate and future crop improvement, and to facilitate capacity development in the respective member countries. The network presently comprises of 12 member countries in Southern Africa, with the SPGRC secretariat established in Lusaka, Zambia. SPGRC is acquiring an increasingly important role as regional representative at international fora on issues of international trade and intellectual property rights, as well as concern over biodiversity. Deliberate inclusion of training as an objective in the programme has greatly contributed to the success of the network.

The SPGRC network has two separate components, which includes the SPGRC regional genebank in Lusaka, Zambia, and the complementary SPGRC network on plant genetic resources in twelve SADC Member States. As the regional centre of the network, the SPGRC in Lusaka co-ordinates the plant genetic resource activities throughout the region, retains germplasm base collections and provides a regional back-up facility to store seeds over extended periods. It also provides facilities for meetings of Member States´ representatives of National Plant Genetic Resources Committees (NPGRC). Only skeleton staff is retained at SPGRC. The director of the Centre is also the coordinator of the SPGRC Network.

The SPGRC is placed as an institution under the Food, Agriculture and Natural Resources Directorate (FANR) of SADC, which allows it to promote plant genetic resources activities on a regionally collective basis. This has yielded considerable benefits. SPGRC has become a focal point for addressing legal, socio-economic and technical plant genetic resources issues, strengthening SPGRC as a regional platform to discuss topics on the GPA, CBD and PGRFA in general. Thus far, only Malawi and Tanzania have ratified the International Treaty on PGRFA, but the SPGRC actively encourages the NPGRCs to promote this issue for follow-up in the national political agendas.

A major strength of the SPGRC network has been the way in which national interests have been effectively incorporated into its workings through the Board. This Board comprises of the chairperson of each of the NPGR committees and the Director of the SPGRC as the secretary of the Board. Also, a representative of the FANR, IPGRI and NGB partake in the board meetings.
NPGR Committees have been established in the 12 member countries to coordinate the establishment/ strengthening of routine germplasm management activities, develop programmes to inventory materials kept by various research institutions and continue collection, multiplication/regeneration, and characterisation and training.

Seven Regional Crop Working Groups (RCWG) i.e. for oil producing plants, fruit and nuts, cereals and food legumes, vegetatively propagated crops, vegetables, forage and fodder and *in situ* have been established, assisting the SPGRC in formulating crop specific strategies, priorities for *in situ*/on-farm conservation and *ex situ* conservation, and setting up standards for handling plant genetic resources. Recently, SPGRC has installed a database (SDIS) with multiple entry accession via an internet gateway, providing access to over 30,000 germplasm accessions. Most of these accessions have been collected and characterised under the SPGRC network programme. Due to the growing awareness of SPGRC as a regional network programme and because of the database, there have been a growing number of request for germplasm.

Although most national genebanks have an adequate infrastructure and are well supplied with necessary equipment, some countries have been less active than others in increasing their collections of plant germplasm. Civil war has been a major drawback, particularly in Angola, and drought has hampered efforts in many countries. In addition, lack of financial and human resource capacity, reflecting the economic situation in some member States, has impacted adversely on activities. Similarly, the membership of the national working groups is not always optimal, limiting the progress

at national level, as well as at the regional level and in board discussions, which reduces the feed back and limits the priority setting process in the network especially at strategic level.

The financing arrangement of SPGRC is unique. The long-term commitment of the Nordic countries in providing technical and financial assistance to SPGRC has been fundamental to the success of the network. This commitment ensured the establishment and consolidation of the PGR programmes at national and regional levels since 1989. While the first phase of the project was fully funded by the Nordic partners, an increasing proportion of the costs is being shouldered by SADC Member States. Currently 60% of total funding is contributed by the Member States, whose share will increase by 10% each year as indicated in the MoU. Many local genebank facilities have been built or renovated with local funding, while staff of the National PGR Centres is locally employed. Increasingly, the national programmes are encouraged to compete for grants offered by international donors or participate in projects coordinated by IPGRI and other international organizations that generate small amounts of financial support. Fundraising capacity of the SPGRC network members is however not yet strongly developed and needs substantial support.

3.Central Asian and Trans-Caucasian Network on Plant Genetic Resources (CATCN-PGR)

The Central Asian and Trans-Caucasian Network on Plant Genetic Resources (CATCN-PGR) is a young and promising network. The network is established in eight countries, each with extensive genetic diversity of globally important crop species, such as fruits, nuts and melons. Most countries in this region were left without a systematic and coordinated national plant genetic resources programme in place upon the break-up of the Soviet Union. The CATCN-PGR is one of several regional networks functioning under the CGIAR Collaborative Research Program for Sustainable Agricultural Production in Central Asia and the Caucasus (CAC).
CATCN-PGR was established during an international workshop held in Central Asia in Tashkent, Uzbekistan in 1996. CATCN-PGR member countries include Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Turkmenistan, Tajikistan and Uzbekistan. All countries have endorsed their membership to this network through formal notifications at the Ministerial level.

Specific goals of the Network include: 1) the establishment of an up-to-date information system on PGR for Central Asia and the Caucasus; 2) the strengthening of cooperation between Central Asian and Caucasian countries and the N.I Vavilov Institute (VIR) in St. Petersburg, Russia and 3) the strengthening of capacity building on PGR within the national programs of Central Asia and the Caucasus. The Network is organized into nine Working Groups for respectively 1) cereals; 2) grain legumes; 3) fodder and pasture crops; 4) fruit, berries, subtropical cultures and viticulture; 5) vegetables and melons, 6) industrial crops, 7) wild (edible) medicinal and aromatic plants, 8) cotton and 9) forest species. These Working Groups represent the implementing component of the Network. Current activities pursued by the Network include the building up of a database on fruit and forest species and the follow-up on two project proposals, one on the establishment of a PGR documentation system in Central Asia and the Caucasus and the other on the strengthening of *in situ* conservation of fruit trees. Both proposals address specific needs identified by countries through *ad hoc* Workshops organized by the Network in 1998 and 1999.

The network is highly dependent on external funding. Most member countries of CATCN-PGR lack the resources to support biodiversity conservation activities in any significant way. In addition, the region is also not well known among the donor community and international organisations. CATCN-PGR is currently receiving support by the CWANA Regional office of IPGRI in Tashkent, Uzbekistan, which provides staffing facilities to coordinate the Network. Other funds are primarily project related. Under the network, a number of programmes are carried out.

One project concerns the “Conservation, Evaluation and Utilization of Plant Genetic Resources from Central Asia and the Caucasus” which is funded by the Australian Centre for International Agricultural Research (ACIAR) and implemented by ICARDA in cooperation with the national partners, and the CGIAR Centres CIMMYT, CIP, ICRISAT and IPGRI. The goal of the project is to collect, conserve and document field crop plant genetic resources in the CATC region and to promote their utilization in breeding programs by undertaking preliminary evaluation for quality and tolerance to abiotic stresses.

Another programme concerns 'In situ/on farm conservation of Agrobiodiversity in Central Asia" and is implemented with funds from UNEP-GEF, IPGRI and own funds to enhance conservation actions by farmer communities and to strengthen national institutions, farming communities and NGOs. UNEP-GEF will also fund a new project on conservation of crop wild relatives in Uzbekistan and Armenia. IFPRI and IPGRI are funding a project in Uzbekistan and Turkmenistan to understand effects of rural and national policies and tenure practices on the conservation and use of plant genetic resources.

In addition, a number of collecting missions on pistachio, pear, melon, pomegranate, vegetables, and cereals were conducted in the region jointly by member countries. Regional databases on plant genetic resources in forest species, fruits and cereal crops were established. In Uzbekistan a national database on cotton was recently established and currently an Information Sharing Mechanism for PGRFA is

under construction. The network has been active in publishing results of the collaborative research activities.

A Steering Committee consisting of national coordinators meets every two years to define objectives and decide on the work plan. National coordinators are motivated but most of them are of old age. There is a high need for graduate and post-graduate training among the younger generation. The CATCN-PGR network is a Network dominated by public researchers. The involvement of farmer communities, private sector and NGOs in biodiversity issues at national working group level is limited. Members share the strategic vision that development at national level can best be mobilized at regional level. The network has proven to be an excellent forum to discuss and set priorities, coordinate activities, draft joint proposals and act as a support mechanism for research and development in the area of agro-biodiversity in the CATC region

4. SABONET

The Southern African Botanical Diversity Network (SABONET) is a regional capacity building network and a good example of a south-south collaboration in contrast with the many north-south programmes in Africa. The network involves 10 countries of Southern Africa and aims to build the capacity of professional and support staff in member countries to develop and strengthen the national herbariums and botanical gardens, in an effort to conserve the botanical diversity in the region, which includes some 30,000 species of flowering plants and ferns (10% of the global flora) within arid, Mediterranean, forest, mountain, coastal and wetland ecosystems.
SABONET is effectively a GEF (Global Environment Facility) project implemented by the United Nations Development Programme (UNDP), with the South African National Botanical Institute (NBI) as the Executing Agency, responsible for the overall management and administration of the project. SABONET was conceived in 1990 during a meeting in Maputo attended by regional botanical experts jointly elaborating on botanical needs and activities, after many years of armed conflict prevented such collaboration. After further consultations, a plan was developed in 1993 that sharply focussed on capacity building, which was submitted to UNDP, and provisionally approved by GEF in 1994. The programme was stalled in 1995 because South Africa and other countries had not yet ratified the Convention on Biological Diversity (CBD). After ratification by the member countries, the full programme could finally start in 1998. Necessary co-funding from USAID/IUCN ROSA through the NETCAB (Regional Networking Capacity Building Initiative) was meanwhile secured in 1996 by the NBI to start up activities.
The project is co-ordinated and guided by a Steering Committee comprising representatives of each participating country. The chairperson of the Steering Committee is elected by its members, and supported by the Project Coordinator's office. The Steering Committee is for the duration of funding, strengthened by inclusion of a NETCAB representative, a SPGRC *ex-officio* member and independent scientific advisors from appropriate botanical institutions in donor countries.

Catalyst actions in SABONET contributing to member engagement and success of the network were:
- substantial changes in the regional socio-economic environment
- the ratification of the Convention on Biodiversity Diversity
- the increasing demand for information and services from national governments
- the opportunity for Southern African taxonomists and conservationists to expose their work to the international community.

The GEF and USAID/IUCN co-funding enabled to establish the network mechanisms for information exchange, and capacity and institution building. Effective communication was achieved among stakeholders through Steering Committee meetings and annual Working Groups meetings at the national level. Despite cumbersome regional e-mail communication between national contact persons and the network secretariat, considerable awareness was built among member countries and allied organisations and networks. The SABONET newsletter of 2002 was read by 2000 readers in 77 countries. Communications and awareness on biodiversity issues was further supported by a substantial number of published articles in the SABONET newsletter and in other journals, such as on needs assessment of herbaria and field expeditions. SABONET has been able to significantly strengthen the institutions and infrastructure throughout the region by providing the herbaria with e.g. microwave ovens, microscopes and field equipment, including vehicles. The programme has facilitated in building a strong core of botanists, taxonomists, horticulturists, and plant diversity specialists of the national institutes through training and formal post-graduate courses, as well as through internships, and professional in-service training by appointment of trained coordinators. Participating institutions have meanwhile incorporated many of the SABONET contract staff and are able to independently continue with inventories, checklists, red data and threatened plants databases developed serving national biodiversity strategies and action plans.

Further key to the success of the SABONET programme was the programme's coordinating office at NBI, providing communications support and monitoring of the national and regional programmes. NBI in collaboration with the Steering Committee prepared a SABONET II proposal to consolidate

achievements beyond 2004, but this was recently turned down by GEF/UNDP. As also other funding support has finished, individual countries are encouraged to develop their own proposals for donor funding to meet the targets of the Global Strategy for Plant Conservation (GSPC 2003). SABONET in its present form will cease to exist and new ways for collaboration must be researched.

SABONET is a typical example of a temporary capacity building network. The project is an exercise in south/south development based on the sharing of collective skills in the region. It has been cost-efficient as only southern African consultants and infrastructures have been involved. Participation by scientists from Northern institutions on the Steering Committee provided necessary links with these organisations. SABONET was able to obtain substantial GEF funding as it fitted well with the requirements to contribute to building regional cooperation in implementing the Convention, promoted the utilisation of local and regional expertise, and assisted eligible countries in fulfilling their obligations under the Convention.

5. Coconut Genetic Resources Network (COGENT)

The decision of the CGIAR to include coconut in its research portfolio in 1992 paved the way for the provision of international support to coconut research. The International Coconut Genetic Resources Network (COGENT) was established under the umbrella of IPGRI-APO upon the recognition that international support and global coordination of research in coconut is essential to make coconut more productive and beneficial to small coconut farmers, while these contribute substantially to the world's coconut output. Such is needed as many coconut-producing countries lack both the human and material resources to conduct expensive and time-consuming research. Starting with 15 countries, COGENT has rapidly developed into an active global Network currently involving 38 coconut producing countries. COGENT aims to improve coconut production on a sustainable basis and increase income in developing countries, through improved cultivation of the coconut and efficient utilization of its products.

The network consists of five sub-regional networks: South-East Asia, South-Asia, South Pacific, Africa and the Indian Ocean, and Latin America and the Caribbean. In order to become a member of COGENT, countries must write a letter to a regional representative in the Steering Committee (another member) or to IPGRI and agree on a set of principles which include supporting the cost of a national representative; the intention to conserve, protect and maintain the country's coconut diversity; and willingness to exchange germplasm information and material. Member countries are not required to pay member dues. A MoU between COGENT and member countries is being considered. Ten National Representatives, two per region, are elected for a three year term in the COGENT Steering Committee, meeting every year to decide on programme priorities and activities. Priorities are further reviewed by IPGRI to enhance complementation and effectiveness (this is what I mean by a finding that could be brought into the findings section and elaborated…what is the role of the coordinating body in "enhancing complementation and effectiveness". It seems to be code wording for something that might be interesting to explore in terms of the role of the coordinating organization as it relates to network success.. Non-voting members in the Steering Committee include the Asian and Pacific Coconut Community, and the COGENT Coordinator.

COGENT Objectives

- Establish and maintain an international database on existing and future collections
- Encourage the protection and use of existing germplasm collections
- Identify and secure additional threatened diversity by developing and adopting suitable technologies and conservations strategies
- Promote greater collaboration among research groups in producer countries and advance technology sources in the exchange of germplasm and the development of

COGENT is managed as part of an IPGRI project. The COGENT coordinator is an *ex officio* member of the network, coordinates the planning, implementation, monitoring and evaluation of COGENT's programme, project and activities, and retains linkages with IPGRI, collaborating institutions, programmes and donors. The COGENT secretariat at the IPGRI-APO office in Malaysia facilitates and coordinates activities in information services, publications, training and collaborative research proposals.

Among the five priority areas of research in COGENT, set at the 1991 CGIAR Technical Advisory Workshop in Indonesia, the enhancement of coconut genetic resources has been COGENT's primary mandate during its first 10 years of operation. This included collection, characterization, conservation and utilization of coconut germplasm at national and regional levels. Four International Coconut Genebanks (ICG's) in Papua New Guinea, Indonesia, India and Ivory Coast respectively have been strengthened and germplasm put under the auspices of FAO, while the hosting of a fifth ICG in Brazil is under negotiation. COGENT has also given support to a number of national coconut germplasm banks. Yearly, a number of trainings and workshops has facilitated capacity development of member

countries, focussing on embryo culture for virus-free reproduction and safe exchange of material, germplasm collection and characterisation. In cooperation with CIRAD and IPGRI, COGENT has developed the International Coconut Genetic Resources Database, data of 1416 accessions from 23 COGENT members, and their inclusion (is included) in the SINGER database is being initiated.

The unlocking of access to coconut genetic resources and the regional collaboration has resolved some of the serious constraints to coconut research, which led in turn to an explosion of collaborative research initiatives. This was instrumental to establish a basis for collaboration on the broader aspects of coconut research and development, focusing not only on technical challenges of genetic resources management, but also on issues with a social element, providing COGENT a direct link to smallholder farmers and poverty reduction. This in turn has contributed successfully to addressing poverty reduction in coconut growing communities, countering the image of coconut being a high investment plantation crop. The above has followed a conscious strategy to blend factors that would give the network a good chance of success, both with members and funding agencies.

COGENT has facilitated the development of farmer participatory research in identifying important farmers' varieties and has promoted the economic viability of promising coconut products. Based on this, COGENT has developed and piloted projects on income generation to promote germplasm conservation including deployment of high yielding and adapted varieties, production and marketing of coconut high value products, and livestock and fodder intercropping production with coconut. Owing to COGENT's successful activities some research and industrial groups, including IPGRI, have recommended to expand COGENT to embrace a much wider research portfolio, involving the concept of a coconut global research for development programme. This proposal has received positive response and is expected to be carried out in collaboration with the Asian Pacific Coconut Community (APCC) and the Bureau for the Development of Research on Tropical Perennial Oil Crops (BUROTROP) under the umbrella of the Global Forum on Agricultural Research (GFAR).
The Network's mode of operation, access to germplasm information from other members, learning of new technologies, opportunities to join training courses and participate in collaborative research activities has ensured relevance to member countries and has created a broad sense of ownership, especially in member countries of South and South-East Asia and the South Pacific. While some member country governments, even big coconut growing countries, historically have provided lower priority to coconut research, political support in these countries is growing through publications, field days, and projects on poverty reduction in coconut growing communities.

The dynamic role of the Network coordinator and other members of the COGENT Secretariat in networking mobilizing, fundraising and gaining the confidence of in-country contacts and donors at every level of activity are recognized, but at the same time also provide a fundamental weakness to the network. External funding has played a critical role in providing COGENT with the means to support the activities of the network. Until 2001, COGENT has implemented a total of 125 research grants for projects in 28 countries with external funding coming mainly from the Asian Development Bank (ADB), the International Fund for Agriculture (IFAD) and the Common Fund for Commodities (CFC). COGENT further received support from numerous other donors, including GTZ, DFID, CIRAD, ACIAR, and BUROTROP. These donor agencies and partner institutions belong to the CGIAR Coconut Support Group. This Group was formed to foster international support for coconut research, and facilitates the financing of priority activities identified by the Steering Committee.

6. Latin American Maize Programme / Latin American Maize Network on PGR (LAMP/N)

The Latin American Maize Project (LAMP), carried out between 1987 and 1995, is the only example of a successful public-private international collaboration on plant genetic resources. The programme was initiated in 1987 through a grant of $ 1.5 million by Pioneer Hi-Bred International, and was carried out with administrative support by the Agricultural Research Service~~s~~ of the US Department of Agriculture (USDA-ARS), and involved the collaboration of Principal Investigators from 12 participating countries in the Americas, i.e. Argentina, Bolivia, Brazil, Colombia, Chile, Guatemala, Mexico, Paraguay, Peru, Uruguay, Venezuela, and the USA. The programme was coordinated by

USDA-ARS, advised by a Senior Breeder of Pioneer Hi-Bred International and carried out in close collaboration with CIMMYT and Principal Officers (PI) in the network member countries.

LAMP dealt primarily with the agronomic evaluation of farmer variety accessions collected from the mid-1900s and onwards that were held by genebanks in the cooperating countries, and with facilitating access of this information to maize breeders. A secondary objective of LAMP was to survey the seed quantities and conditions of the germplasm held in the different genebanks. During LAMP the co-operators evaluated over 12,000 accessions (74% of maize races in the region) in locations covering most regions of the Americas where maize is grown. The locations were divided over five fairly homogeneous areas, including four different altitude and two latitude ranges.

LAMP was designed around a five-stage maize evaluation protocol. The first two stages included the agronomic evaluation of accessions belonging to a particular region. This involved the planting of 14,357 accessions, yielding finally 12,113 evaluations, whereas 2,244 accessions were lost due to low germination. Based on the results, 268 elite accessions were selected for the third phase (evaluation phase), which were interchanged among regions belonging to the same homologous area and again evaluated for agronomic traits and yields. At the same time elite accessions were crossed in isolated spots with the best testers of each region for combining ability, which seed was then interchanged again and evaluated in phase 4 (pre-breeding). In the fifth stage of LAMP, each Principal Investigator was to enhance selected germplasm to the individual country's breeding objectives. Funding at that time was limited and provided only space for one year of small scale enhancement. In 1991 a catalogue and CD ROM was published with data of accession evaluations of phase 1 and 2. Final results of LAMP were published in a catalogue and CD-ROM in 1995. LAMP's procedures for agronomic evaluations proved to be an efficient method to screen a large number of accessions. Procedures set in LAMP were also effective in determining the precise status of germplasm banks in Latin America, to select accessions that needed regeneration, and to establish adaptability of landraces and other accessions. Effectively the programme discontinued in 1995.

LAMP was particularly effective in establishing a network for cooperation among the Latin American countries. Evidenced by poor germination of genebank accessions and promising results from the evaluations, LAMP aroused a sense of urgency with the co-operators in the programme, providing the interest and political will to continue the network beyond the lifespan of LAMP. After an initial phase, LAMP co-operators decided in 1992 to continue the programme under the "Latin American Network on Maize Plant Genetic Resources"[3] carried out under the coordination of CIMMYT. A massive regeneration programme was launched with one-time funding from USAID under the project name "Noah" and additional annual aid from the USDA-ARS National Center for Genetic Resources Preservation (NCGRP, formerly NSSL). Under the project nearly 7000 collections were re-generated and back-up samples curated and stored in trust at CIMMYT and at NCGRP. CIMMYT constructed new seed storage facilities in 1996, which increased the ability to store the regenerated seeds sent to CIMMYT by the Co-operators. Starting with regeneration and *ex situ* conservation of maize germplasm, the network programme gradually moved to support pre-breeding activities to enhance the genetic base of maize in the co-operator countries. Maize pre-breeding activities have the dual purpose to enhance *ex situ* conserved germplasm for use in (hybrid) breeding for commercial purposes, and to contribute to *in situ* germplasm conservation by farmer-breeders.

The network has thus far been strongly CIMMYT and USDA/USAID driven, although the level of urgency at the national level has helped generate a joint sense of ownership. In-kind contributions in the form of operational expenses for regeneration, evaluation and storage are substantial, contributing an estimated 40-50% of total programme costs. Besides funds from CIMMYT's core budget for general Network Coordination and Workshops, the programme has received support from USDA/USAID, the World Bank's CGIAR Genebank Upgrading Project, and from the governments of Japan and Mexico. Since 1992, the Network operates with bilateral MoUs between the national

[3] The official title of the programme is "Latin American Regeneration and Conservation Network on Maize Plant Genetic Resources". In this study the LAMP network and the successor network is referred to as LAMP/N

institutions and CIMMYT. The agreement states the objectives, regulates mutual responsibilities and the use of the Material Transfer Agreement (MTA). Due to restrictions for germplasm exchange set forth in the Andean Pact Agreement, some countries have not yet signed the new three-year contract by the time of this study, but were expected to do so in near future.
Neither LAMP nor the current Network has worked with a Steering Committee, although such has been under consideration. Regular workshops and communications with the Principal Investigators have thus far been useful tools in providing the necessary coordination in the evaluation and setting of working plans and in disseminating information on protocols for regeneration and storage of maize germplasm. Funding has limited the support in strengthening the co-operators storage facilities and in capacity development on conservation and database management. However, national support to develop a good active seed storage bank is increasing, particularly in Brazil, Bolivia, Chile, Ecuador, Guatemala, and Venezuela.

Fifty core collections of exotic maize material from LAMP, both temperate and tropical accessions, and 7 commercial tropical hybrids supplied by DeKalb (DEKALB Ag Research—now part of the Monsanto Group) were used to initiate the programme. The GEM protocol involves co-operators to execute a multiple step crossing programme using selected exotic germplasm and proprietary inbred lines. Cooperators do not know what lines they are receiving or what other co-operators will receive their crossing lines. Breeding crosses are subject to evaluation as testcrosses for yield and other agronomic and value-added characteristics. While the project is still ongoing, several superior GEM enhanced lines and associated data have become available to users through GRIN.

GEM borrowed the organizational setup from LAMP using Principal Investigators as Cooperators and annual workshops to discuss results and decide on work plans. GEM has a Technical Steering Group of 9-11 Cooperators, composed of at least five members of private industry, meeting frequently to discuss policies and protocols. A Coordinator and small number of staff supported by USDA-ARS run the project. Effective communications such as a newsletter, field days, Cooperator meetings and a website have contributed to transparency and ownership.

The public-private collaboration mechanisms exemplified in LAMP/N are captivating as it provides direct opportunities and benefits for both public and private sector institutions, and simultaneously exhibits weaknesses in national capacity building. The strong focus on direct utilization of germplasm, effectively strengthening the ties of genebanks with the users of germplasm i.e. researchers and breeders, is unique. Such programmes are well positioned to attract private funding which makes the concept more cost-efficient than similar programmes in public sector domains. While this concept is appealing, such programmes are likely to succeed only for crops that have large commercial interests behind them. Likewise, matters on access and benefit sharing, which form an integral part of the International Treaty on PGRFA, might form a barrier in the collaboration, since this issue has not been discussed in this network.

Network on Germplasm Enhancement of Maize (GEM)
In the USA, another spin-off of LAMP is the US-based Germplasm Enhancement of Maize (GEM) project. GEM is a cooperative effort of the USDA –ARS, universities and breeding industry to use enhanced maize germplasm derived from elite LAMP accessions to broaden the genetic diversity of maize hybrids. By 1994 it was clear that no one party could bear the large cost of such effort and only a coordinated and sector-wide cooperation could provide a solution to ensure that LAMP materials be used in breeding programs.

The project is based on a voluntary membership basis. Currently GEM involves 24 US based breeding companies and 14 university and ARS scientists, and recently also 3 international collaborators including two Latin American Institutes: INTA from Argentina, and EMBRAPA from Brasil have partnered, the third is a Canadian Institute. In addition to $ 0.5 million in initial funds (now $1.0 millions) appropriated annually to USDA-ARS by the US Congress, collaborators are requested to donate in-kind significant research and evaluation space and materials to GEM work, which composes a total amount of an additional US$0.45 million on average.

7. International Network for Genetic Evaluation of Rice (INGER)

The International Network for Genetic Evaluation of Rice (INGER) is a global network and partnership programme focusing exclusively on the exchange, testing and utilisation of rice germplasm. Since more than 27 years, INGER, formerly known as the International Rice Testing Programme (IRTP), has organized the dissemination of improved rice germplasm, developed by the NARS of member countries and the IARCs, in particular IRRI, WARDA and CIAT, and have shared the information of the INGER rice trials (or nurseries) datasets through publications with the world. INGER has both a global perspective and a regional focus. Whereas WARDA and CIAT are responsible for regional rice nurseries that answer to the unique needs of respectively Africa (INGER-Africa), and Latin America and the Caribbean (INGER-LAC), IRRI is primarily responsible for the Asian region. But IRRI also distributes rice nurseries at the partner's request to Africa, Europe, and because of fund limitations of INGER-LAC, increasingly to Latin America and the Caribbean (INGER-Global). There is little interaction between the three INGER programmes because of limited funds.

The number of countries collaborating with INGER-IRRI between 1995 and 2003 included 76 countries, of which 28 have requested INGER nurseries on a regular basis. INGER has become an integral part of the breeding programmes of the partner countries and remains the number one source of genetic materials, both for NARS and IRRI. Promising materials identified in the INGER nurseries are channelled into their national testing programmes and/or used in crossing work. Designated NARS institutions send to INGER their own materials, or materials shared to them by other institutions, such as traditional or released varieties, advanced breeding lines, segregating populations, and rice hybrids, for inclusion in one of the 21 different types of INGER nurseries. Breeders working at the IARC's rice programmes make sure that their elite materials are channelled into the network as well. The proportion of unique entries from NARS compared with those of IARCs is considerable and varies from 47% (2003 nurseries) to 70% (1999) of total. INGER collects and analyzes data of the nurseries from NARS and prints these data for distribution. INGER's germplasm information and evaluation data are entered into the INGER Information system (INGERIS) and uploaded into the International Rice Information System (IRIS). IRIS is presently being improved to track down all intellectual property rights associated with rice germplasm, and is expected to serve as a global database on rice germplasm.

Partners in the programme fully recognize the importance of INGER as an efficient vehicle for sharing of germplasm and its related information. This has provided the network substantial political backing and supports continuing counterpart provisions for implementing the nurseries. Since the network's foundation, INGER breeding materials have been used to develop more than 570 rice varieties released in 62 countries, and have contributed significantly to the world's rice output since 1975.

INGER membership is free; any NARS requesting and/or contributing seed to INGER automatically becomes a member of the network. Members are made aware of the INGER Code of Conduct that states the network's general policy on germplasm sharing and utilization. Since 1999, the Council for Partnership on Rice Research in Asia (CORRA) serves as the Steering Committee of INGER-IRRI, which has served to strengthen partnerships between NARS and IARCs. CORRA annually meets to review the accomplishments of INGER and decides on the broad policies and directions of INGER-IRRI once a year. A Technical Advisory Committee composed of selected NARS and IRRI scientists meets every 2 or 3 years and provides guidance on technical matters. The INGER Coordinators in IRRI, WARDA and CIAT are appointed by their respective institutes. NARS partners select their CORRA representatives and national coordinators and key scientists.

The INGER network is highly integrated into the IARCs system. Since 1998, the IRRI core budget has been the major source of funds to run the INGER-Global programme. The budget is declining over time, which forces INGER to reduce the level of its activities, such as reducing the number of nursery sets distributed to NARS partners, reducing the frequency of technical meetings, and stopping the monitoring trips of INGER co-operators. Finding external funding for training and technical meetings

has been difficult. To further increase cost-efficiency, a new mode of germplasm distribution has been developed in collaboration with NARS where NARS prioritize their nursery requests and testing sites, and are encouraged to multiply and distribute INGER materials in-country. Other ways to increase cost-efficiency are contemplated in Technical Assistance Committees (TAC) and CORRA circles such as closer linkage of INGER with regional and national projects of similar interest, the introduction of quota systems for NARS, and charging associated with INGER germplasm exchange functions.

Major challenges facing INGER are the rapidly changing intellectual property rights (IPR) environments and the changing plant quarantine rules and regulations in many countries. Variety contributions of NARS to INGER had been declining from the mid-nineties to 2002 because of fear of possible misappropriation of the shared varieties. IPR awareness campaign workshops and the introduction in 2001 of a transparent Material Transfer Agreement (MTA) for distribution of NARS material have reversed the declining contributions of varieties from NARS.
The future of INGER depends on the capability of the network to effectively deal with issues threatening the free exchange of rice germplasm, such as the changing IPR environment, reduced funds for germplasm exchange, increasing private sector participation and the development of molecular techniques for use in breeding. Participation of the INGER-Africa and INGER-LAC programmes is essential to be able to discuss the needs of all rice growing countries in a global perspective. INGER key informants and coordinator considered the frequency and funds available for workshops, technical meetings and exchange visits presently too low to adequately deal with these demands.

8. South Asian Vegetable Research Network (SAVERNET)

The South Asian Vegetable Research Network (SAVERNET) is an example of a regional collaborative research and development network, which success is based on a strong linkage between germplasm evaluation, agricultural extension and farmer adoption. The network covers six member countries: Bangladesh, India, Sri Lanka, Nepal, Bhutan, and Pakistan, with the Asian Vegetable Research and Development Centre (AVRDC) in Taiwan functioning as the network hub, providing expertise and coordination. Scientists of one or more research stations per member country actively participate in the network programme. SAVERNET is one out of five vegetable research networks that are hosted and coordinated by the AVRDC. Other networks include AVNET and CLVNET in South East Asia, CONVERDS in Southern Africa and REDCAHOR in Central America.

Following the early success of AVNET in South East Asia, SAVERNET was established in 1992, recognizing the value of good genetic material for vegetable production and the need to address problems of pest and diseases in the existing vegetable varieties in South Asia.

SAVERNET Objectives (cited from the MoU):

- To foster collaborative research partnership among the NARS, to attain better and more efficient use of expertise, technologies, germplasm and scarce resources available in the region.
- To facilitate the generation and adoption of improved technologies for selected vegetable crops, through collaborative research, information exchange and scientific consultation.
- To help develop/ strengthen the technical proficiency of vegetable researchers with the ultimate end of building a critical mass of scientists capable of responding to the national and regional needs for efficient and sustained vegetable production.
- To strengthen linkages for acquisition and exchange of relevant technologies

This came after a two-year sponsored consultation of the Asian Development Bank to develop the framework, joint research and training programme for the network. The ADB subsequently provided SAVERNET the necessary financial assistance during a period of 8 years (1992- 2000) to carry out the research and development programme and to carry forward and consolidate the achievements.

Under this programme, SAVERNET carried out collaborative research programmes evaluating superior varieties in tomato, eggplant, chilli, onion, okra, cabbage, cauliflower, melon, and cucumber, and developed technology packages for adoption by farmers. The programme yielded the identification and exchange of hundreds of varieties, resulting in 36 superior vegetable varieties selected for yield and pest and disease resistance, which were recommended for on-farm demonstration trials. Exchange of research information, new ideas, training of manpower and infrastructure development in vegetable research and development yielded greater efficiency of the national programmes. Also, progress was made on the identification of problem areas and control measures, and year-round tomato production was introduced using heat-tolerant varieties from AVRDC, while several applied technologies also were introduced providing greater yield.

Since 2000, SAVERNET remains highly active. The existence of SAVERNET has been instrumental to start a new sub-network on mungbean to evaluate and promote mungbean originating from the NARS and AVRDC for farmer adoption. Also sub-networks on tomato and chilli have been started up. Currently SAVERNET's activities involve five vegetable programmes: 1) on-farm evaluation of elite vegetable varieties, 2) bacterial wilt resistance in tomato and eggplant, 3) leaf curl virus and other virus resistance in tomato and chilli, 4) IPM of eggplant fruit and shoot borer, and 5) off-season vegetable production and training. Presently, AVRDC including SAVERNET members are working on a database for tomato, peppers and indigenous vegetables, using results of their research. This

database includes passport data, horticultural characteristics, nutritional information, which will be available soon through an internet interface for users worldwide. Results of research are made public through joint publications.

SAVERNET is a highly formalised network with a stable membership. Purpose and objectives of the network have been formulated by the network member countries at the start of the network in collaboration with AVRDC, and are agreed upon at the Ministerial level through a Memorandum of Understanding. The MoU also states the member's obligations including the facilitation of germplasm exchanges, execution of agreed programme activities, and in-kind contributions for staff time, field trials, laboratory research and hosting of local network meetings. Annual or bi-annual project working group meetings, training and consultation visits are usually effective in the preparation of work plans, and the identification of changed and new needs, paving the way for new proposals. The Steering Committee, consisting of national representatives, meets infrequently to decide upon strategies and priorities of SAVERNET, but only when needed and funds are available.

SAVERNET provides the umbrella under which the members are free to develop joint proposals involving two or more countries, to obtain funding and jointly implement the activities for the benefit of the parties concerned. AVRDC serves as the catalyst and facilitator, stimulating various activities in the network, interacting with the partners in developing appropriate proposals for funding with potential donors. AVRDC supports the network through international and locally recruited scientists, and sometimes regional representatives, and makes its facilities and genetic materials available to the network members.

Members perceive the collaboration under SAVERNET as highly effective and beneficial; because of the visible benefits for individual researchers, and research and extension organisations particularly in 1) germplasm and technology exchanges, 2) capacity development, 3) international exposure and 4) greater access to donor funds. SAVERNET programmes have a high economic return on investment (an ADB survey rated it with more than 90% IRR), which has given the network also a high political and donor backing. As a result of this, countries have developed a good sense of ownership, under which umbrella they feel comfortable to develop new programmes in response to national and regional needs. Flaws in administrative management and high staff rotation at the NARS and in SAVERNET meetings have been mentioned as weak factors of the network.

The AVRDC Secretariat continues to play a central role in the network's effectiveness. Although this task has been assigned from the beginning, it also signifies some weaknesses in the matrix, particularly with regard to the fundraising capacity of the member countries. Presently, members contribute an average of only 10-15% in-kind to the SAVERNET network programmes. External funding remains extremely important to sustain the network's exchanges and collaborative programmes. The AVRDC has thus far been successful in financing the SAVERNET programmes. Beyond the core ADB funding, this includes DFID, CIMMYT, GTZ/BMZ and USAID.

9. EURISCO

The pan-European EURISCO network, meaning "I find" in old Greek, emerged out of an EU project, the European Plant Genetic Resources Information Infrastructure (EPGRIS). The aim of the EPGRIS project was to develop a gateway for information on plant genetic resources maintained *ex situ* in Europe to ensure effective updating of the information thereof. Important outputs of the project were the establishment of national focal persons and a EURISCO database. Thanks to the excellent network of ECP/GR and the involvement of IPGRI it was possible to draw 41 European countries into the programme, including all EU countries and associated states, extending as far as Israel, Turkey, Armenia, Azerbaijan and Cyprus. The EURISCO databases contained, at the time of writing, 906,427 accessions, 27 of the 41 National Inventories were ready to be uploaded to the Central Catalogue; in addition 13 of the National Inventories were also directly accessible via an internet gateway.

EPGRIS and EURISCO form an example of a concerted action on plant genetic resources built largely on existing networks and individual contacts in the region. Although the action was bundled in EPGRIS and strengthened through project partnership and extra funding, the network evolved largely because of strong policy support, both at the EU, and at the national level of the participating countries. Being signatories to the CBD and the GPA, participating countries have the responsibility to construct comprehensive information systems for plant genetic resources for food and agriculture, and to establish a system to provide for regular updating of such information. Therefore, not only were the objectives of the programme very clear and transparent, the developments at the national policy level provided a significant force in each country to generate adequate, although for some countries only in-kind, resources to cooperate in EPGRIS for the development of EURISCO.
EPGRIS was implemented by a consortium of several strategically chosen partners, including ZADI in Germany, NGB in Sweden, RICP in Czech Republic, INIA in Portugal, IPGRI and ECP/GR in Rome, coordinated by CGN, in the Netherlands. To create sufficient synergy among the countries, the EPGRIS countries were arranged into 4 regions: the Nordic, the Mediterranean, East Europe and West Europe. Each region was coordinated by one of the consortium partner, and responsible for content, administration and communication of the EPGRIS programme in the region.

Development of the information infrastructure required significant inputs at various levels. First an effort was made to support the creation and linking of National PGR inventories to one focal point in each member country. After selection and nomination of the focal points, regional meetings were organized and on-the spot training and support provided to prepare the national PGR inventories. In parallel to this development, work commenced on the creation of the core European Search Catalogue for PGR information, which required streamlining of passport data, the creation of a central database with a web gateway, the compilation and loading of initial data sets, and once up and running, the promotion of its use through various means. Important technical support was provided by IPGRI, using the SINGER database as an example. Technical facilities for EURISCO are now overseen by the ECP/GR Secretariat in Rome, and include an extensive mechanism for uploading and validating the data by the Focal Persons, ensuring that information from the national inventories are regularly kept up-to-date and accessible through internet.

The robustness of EURISCO has yet to be tested and strengthened. Enthusiasm and ownership of the network were created primarily through the regional meetings and through regular communications, providing a platform for exchange of information; a welcome occasion for many documentalists, curators to present their professional work and get more international exposure. In addition, the personal efforts and dedication of the EPGRIS coordinators were vital to the success of EURISCO, and such availability for the network will remain important throughout the extended testing and follow-up phase.

Funding by the EU, IPGRI and ECP/GR was essential for the development of the main infrastructure of the network. However, the numerous in-kind investments, mainly staff time and facilities, by the participating countries were and will be vital to establish the network and keep it alive. A follow up programme is currently being developed under ECP/GR coordination and a newly established

EURISCO Advisory Board, but such efforts are likely to be much less intensive. To retain the momentum, national resources need to be sustained to keep the network stay intact. It is also clear that lesser developed countries in the network may need continued financial assistance to ensure regular update of the EURISCO database.

Establishment of EURISCO benefited greatly from ECP/GR (for personal and institutional aspects) and from SINGER (for the technical aspects).

10. System-Wide Information Network on Genetic Resources (SINGER)

SINGER exemplifies the commitment of the CGIAR Centres to facilitate unhindered access to information on genetic resources. The primary objective of SINGER or System –Wide Information Network on Genetic Resources is to provide access to information on the collections of plant genetic resources, which are held at the CGIAR Centres, in trust for the world community under agreement with FAO. Together, these collections presently comprise over half a million samples of crops, forage and tree germplasm of major importance for food and agriculture.

The SINGER database was launched in 1998. It uses a single internet entry point allowing users to simultaneous search the independently managed genetic resources databases of the CGIAR Centres. Being a sub-network of the System-Wide Genetic Resources Programme (SGRP), SINGER is seen not only as a tool for information activities, but more as a means in contribution to other areas, such as policy, public awareness, and capacity building. The integration with SGRP not only contributes to clear objectives but also has provided the means for promotion of SINGER to a vast range of potential users, including national policy makers, plant breeders and genebank curators. This has contributed to the success of SINGER. According to information on its web site, SINGER presently registers an average of 10,000 searches a month.

Strong support in terms of capacity building activities for its members, i.e. in database development in support of genebank management, web and cd-rom enabling, and data quality assurance, has been key to its success. Yet, while SINGER has evolved very rapidly, limited funding support for training could not ensure that all partners equally capitalized on this development. This is particularly true for tools like GIS, web enabling software and data analysis, which is the current trend in capacity development.

SINGER is a highly formalised network without much hierarchy since all members have an equal role and say in the network. Centres all have agreed to adhere to SGRP and therefore to be a member of the Steering Committee. Every 3-5 years a strategic planning exercise meeting with all members is held where the strategy is reviewed and refined. This is the basis of consensus and the main document used by the SINGER coordinator to organise and coordinate the network activities. A steering committee (ICWG-GR) yearly meets to update overall objectives and deliverables for SGRP including SINGER. A full time coordinator has been recruited since the creation of SINGER, who is seconded by a database and help-desk assistant. The organisation aims to be driven by consultation and consensus with its scientists and staffs at the broadest level possible. To reinforce this, the Centres have appointed non-genebank staffs as focal persons while collaboration is conducted at equal level, without the involvement of a strong lead person. This focus has significantly contributed to the sense of ownership in the SINGER network.

SINGER is funded primarily from core funding, i.e. non-project based donor support through the SGRP, as well as from more restricted project funding of specific donors, i.e. World Bank, SDC, EU, Australia and lately also the private sector (i.e ISF funding has been secured for a SINGER-like project at AVRDC). Funding therefore is relatively well secured. No funding contributions from members are required, but in-kind contributions to SINGER are considered to be high. Such contributions are mutually beneficial because of the synergies between SINGER and the member's working plans; SINGER, in fact, is considered an extension of these work plans, which is another contributing factor to the member's ownership of the network. Limitations in core funding for genebanks have previously generated staff reductions especially in terms of curators and information experts, but this problem has meanwhile been largely resolved. The secretariat at IPGRI /Rome has been instrumental in defending and leveraging additional funding for staff input at member level through the SGRP system umbrella to donors.

SINGER has been at the forefront of developing common standards for accessing information on plant genetic resources i.e. by using standard conventions for describing germplasm accessions and uniform references for taxonomy and countries. Additional value is forged by inclusion of characterisation and evaluation data, various retrieval mechanisms, such as collecting missions, maps, and inclusion of

download functions. In 2002, the Steering Committee adopted the use of Open Source Software as the basis for SINGER applications. This was a fundamental move, offering much greater economy (no license agreements) and flexibility with different computer platforms.

As part of SGRP, SINGER aims to further contribute to the creation of inter-linked regional and crop information networks. Projects currently underway are to link SINGER with the CIMMYT, ICARDA and CIP crop databases on wheat, barley and potato. The collaboration of SINGER in the creation of EURISCO has been a good example in regional collaboration on crop based and national information systems. Collaborative efforts are further underway to develop similar PGR information systems, including at the global level in vegetables at AVRDC. Also SINGER is contributing to the development of an international information system on biodiversity, that encompasses plant, animal, aquatic and forest resources, with the FAO, the CBD Clearing House Mechanism and the Global Biodiversity Information Facility.

11.User's Perspective with Agricultural Research and Development (UPWARD)

The User's Perspective With Agricultural Research and Development (UPWARD) is a dynamic, open network of scientists and development organisations working to promote the participation of farmers and other technology users in agriculture research and development. The network aims to increase the sustainability of root crop agriculture and food systems in Asia. It has been particularly successful in bringing together scientists, development agencies, farmers and other users in conducting ground-breaking participatory research, capacity development and in documentation.
UPWARD seeks to address three important challenges facing agricultural research: 1) linking users and R&D professionals for more effective agricultural innovation 2) bringing sustained benefits to less favoured farming areas and marginalized crops, especially women, and 3) working with households and local communities as key actors in problem diagnosis and research activities.

After a long period of conceptualisation, UPWARD was launched in 1989 as a special project under the sponsorship of the International Potato Center (CIP), funded by the Netherlands government (DGIS). In the first 10-year period, the UPWARD programme developed from appraisal of root crop constraints related to Asian food security from a user's perspective into the implementation of action research based on a framework approach for participatory research. At another level, the Network has considerably gained strength by developing from a Network of individual scientists into a Network where individual scientists and organisations work jointly together. Since 2004, after a major restructuring of CIP, UPWARD has received a formal institutionalized role within the Centre, at the same level as the Research Divisions, and reports directly to the Deputy Director General for Research.

The R&D in UPWARD currently covers: production systems, genetic resources, processing, marketing and consumption, and various cross cutting research, such as policy studies, participatory research methods and tools, gender and indigenous knowledge. Currently sweet potato research continues to be the priority activity. Through a livelihood approach UPWARD seeks to integrate research efforts in sweet potato genetic resources conservation, integrated crop management and post-harvest utilization. In the Philippines UPWARD collaborates with the Asian Network for Sweet Potato Genetic Resources (ANSWER), sponsored by CIP and IPGRI, in assessing local germplasm and in database development. UPWARD's potato research focuses on evaluation of CIP germplasm and diagnosis of seed systems. Finally, in partnership with the CGIAR System wide Programme on Urban and Peri-Urban Agriculture (SIUPA), UPWARD is currently undertaking research to assess needs and opportunities for improving agriculture-based livelihood in urban areas.

UPWARD Objectives

- To support research that leads to sustainable improvements in Asian rootcrop Agriculture and food systems
- To test, adapt and disseminate participatory research methods and tools
- To build the capacity of Asian professionals and institutions in user participatory rootcrop

UPWARD puts high emphasis on working in *partnership* with national and local organisations. UPWARD views its network as "partnership programmes" which means that the UPWARD agenda represents the collective priorities of CIP and its partners. A sense of co-ownership is purposely built-in by sharing credits with partners – from authorship in publications to compensation for service rendered (e.g. as training resource persons, sharing of funding obtained from donors). UPWARD works together with individual scientists and institutional members across Asia, including people's organisations, NGOs, local governments, public sector offices and regional universities.

It has currently programmes ongoing with organisations and local governments in six Asian countries: Indonesia, Nepal, Philippines, Vietnam, LAO PDR and China. As a participatory research network involved in field projects, such partnerships represent the core of UPWARD membership, consisting about half the total membership of 51 members. Besides these core members, UPWARD recognizes two other tiers of memberships: a second tier for institutional and individual members currently

involved in co-organizing workshops and training, and a third tier for those individuals and organisations that are using products of UPWARD involved in training and using the products of publishing activities. UPWARD is one of the few open networks, involving plant genetic resources. From year to year members may change the nature of involvement. The network is purposely built with a high level of rotation in membership; when members move on this represents achievement in capacity development efforts.
Expertise input of CIP's and other scientists are crucial to UPWARD. Close links with CIP's regional research programmes in East and Southeast Asia and the Pacific (ESEAP) and South and West Asia (SWA) are maintained who provide technical support to the projects. UPWARD is well connected through its global and regional network of contacts and members, offering access to a wide range on information on agriculture R&D, and providing useful backstopping and support to the different R&D activities. They also facilitate the dissemination of research results to a wider audience, including researchers, development workers and policy makers. UPWARD also draws support and guidance from the Dutch Support Network (DSN), an interdisciplinary association of academics at Wageningen Agricultural University, the Netherlands. DSN participates in UPWARD in various capacities, such as in research and training, facilitation of graduate and post-graduate studies, and in fund raising.

The CIP-UPWARD secretariat at Los Banos, Philippines maintains a small staff providing co-ordination for its regional programme, administration, publication and dissemination of information through a website and database. Through regular reviews, planning meetings and learning workshops, network members jointly set the programme agenda, participate in resource mobilization and provide key inputs to decisions on resource allocation. Being a special funded CIP programme, UPWARD's R&D programme is reviewed annually by CIP's Programme Management Team, based on the network's yearly Technical Cooperation Report. Once every four or five years the Network is reviewed externally, either separately or included in a broader external review of CIP's participatory research programme. UPWARD does not have a Steering Committee but draws input from an Advisory committee, composed of senior Asian researchers, who meet once every two years to review the programme strategy. This together with input of network members through smaller workshops and meetings allow to decide on priorities and work plans.
Thematic network groups were established in the 1990's to provide for more structure within UPWARD, but never really took off because of distance and time constraints of the members.

UPWARD has been successful in fundraising to support its research projects, due to high activity of its coordinator and member affiliates in proposal writing and keeping close links with potential donors. UPWARD receives core funding for its activities from CIP, which funding is complemented for specific R&D projects by other international institutions such as CIAT, ISNAR and international development agencies and donors, such as IDRC. UPWARD has been particularly successful in the field of capacity development in participatory research, which enables UPWARD to raise additional funds internally.
Local partners involved in research projects contribute substantially in-kind and through co-funding of training/workshops, publications and research projects. Contributions by UPWARD to partners are usually in the form of small grants, which is meant for start-up research, eventually leading network members to secure higher level of funding elsewhere. While co-investment by Network members is ideal, the reality is that these individual members' organizations are facing serious resource constraints, especially those in the government sector. In many countries of Asia, particularly Indonesia, Philippines and Nepal, government decision-making authority is now decentralized to the district or municipal level. UPWARD projects have recently increasingly relied on funding contributions from these local government units.

12.Community and Biodiversity Development and Conservation (CBDC)

The Community Biodiversity Development and Conservation (CBDC) Programme is a global network of 14 member organisations which have committed themselves to demonstrate and facilitate the viability and importance of farmer-and community-led innovation to agro- biodiversity research, conservation and utilization. CBDC grew out of discussions in and around the Keystone International Dialogue on Plant Genetic Resources held from 1989-92, which Dialogue recognized the need to complement *ex situ* and *in situ* conservation strategies and to forge larger collaboration between formal and informal conservators and breeders. The CBDC programme was thereupon officially established in 1994 by several Dialogue participants and rapidly grew to include other partners with experience and interest in agro-biodiversity and farmer-based initiatives. After years of network engagement, the CBDC programme has proven to be able to live beyond its founding personalities, most of whom have meanwhile withdrawn. CBDC is currently planning for a third four year phase.

CBDC is a multi-coloured partnership involving both governmental and non-governmental institutions from nearly all continents, including Africa, Asia, and Latin America, working in cooperation with three Northern Partners. The philosophy of this collaboration is the basic principal that the objectives of the programme are so wide ranging and far stretching, that it cannot be achieved without a multi-varied approach and the involvement of many and diverse partners. The primary aim of the network is to serve as a 'learning' platform, for exchange of experiences and know-how in working with farmer communities and use this to develop alternative approaches and contribute to the enhancement of local innovation systems. Secondly, CBDC aims to link farmer-and community-led processes and know-how with national, regional and global policy and debates, in an effort to improve understanding of agro-biodiversity. The latter aspects i.e. stronger political voice and policy focus in response to changing international political and economic conditions and trends is becoming increasingly important in CBDC.

CBDC Mission Statement
(excerpt from mid-term evaluation report, 2003):

- facilitating an active multilevel discourse on community biodiversity issues
- supporting projects that bring scientific methods and training to local crops development and conservation
- insisting on equity between and among regions, southern and farmer leadership, and cultural knowledge and use of PGR at local, regional and global level

CBDC is a formal network, with highly active members, who have through its 10 years of collaboration cultivated a great sense of ownership. Partners have agreed on a set of guidelines outlining the objectives and priority areas as well as coordinating structure, and on a statement of equal voice among all partners. The secretarial unit of the CBDC is divided into a co-ordinating unit in Chile and a programme administrative unit in the Philippines. This structure equally shares the burden and makes use of the partner's complementarities in the most efficient way. The absence of an international organisation as umbrella organisation is offset by the complementary strength of the networks of the partner organisations.
The CBDC is coordinated by a Programme Coordinating Committee (PCC) that meets regularly (at least once a year) on strategic issues. Training is provided in the context of CBDC themes, but is usually limited to regional partners due to high travel costs. An on-line Internet training course on the CBDC themes is under development.

The CBDC Programme is entirely funded through a long-term commitment of a four- member donor group. This has provided CBDC the "protected space" to allow it to grow and develop a track record of demonstrable results. As the programme is preparing for a third phase, efforts are ongoing to strengthen the partners' fundraising capacity in the recognition that it needs to secure additional resources beyond those provided by the donors. Secured funding led to a low profile of CBDC. This is currently being adjusted by providing CBDC more visibility on the internet and greater transparency.

In phase III, CBDC intends to further link up with strategically important partners, networks and coalitions, and will probably adopt an open membership policy.
Because of external funding, direct in-kind contributions of partner organisations to the CBDC programme have been limited. However, considerable funds have been invested into networking and other programmes in conjunction with CBDC programmes. This high leverage function of CBDC's partners, many of which have extensive contacts with individuals, institutions and networks has enabled to carry out the work very effectively and cost-efficient, and is one of the success factors of CBDC itself.

The CBDC is currently divided into three regions: South-East Asia, Latin-America, and Africa, with one partner organisation assigned as coordinator. The South-East Asia Region, coordinated by SEARICE in the Philippines, includes Vietnam and Thailand. This region is well founded and puts strong emphasis on Farmer Field School approaches, gender, and policy advocacy, including mainstreaming documentation and disseminating information both within and outside the network. The Latin American CBDC programme, coordinated by CET SUR, Chile include Columbia, Brazil and Peru, is strongly agro-ecology oriented and includes work on various crops, including wild and non-domesticated plants, socio-economic and livelihood approaches. The African Programme is coordinated by CTDT in Zimbabwe, and includes Sierra Leone, Burkina Faso and Mali, and focuses primarily on the promotion of farmer's local variety selection and seed systems strategies. The CBDC programme in Africa faces some serious logistical and infrastructural constraints because of rotation in partner organisation, communication and language barriers. The role of the Northern partners, which includes partners from Canada, Norway and the Netherlands, focused on input in terms of technical and policy expertise, while most of the field work was carried out in the South.

One of the greatest challenges in the CBDC programme, having such diverse key actors, geography and cultures, was to develop common approaches and priorities. Although different in many ways, the participating organisations shared some basic concerns and values at the start of the programme, and could agree on common orientations to major challenges in the interface of technology and policy. A more elaborate protocol has been developed over a span of several years and was developed to guide relations among CBDC network partners, especially concerning their intellectual integrity, their rights and responsibilities in relation to germplasm, information, funds, technologies, methodologies and systems. The complexities of elaboration often led partners to take refuge in national and regional, rather than international, collaborative activities.

Injected by concerns by partners and donors that the CBDC programme was not structured to support coherent development and intensive exchange of experiences, partners agreed to focus the programme's research and development strategies in phase II into 6 thematic lines, so called T-lines, to organise and stimulate cooperation among partners. The first three concentrated on streamlining plant genetic resources experimentation at the local level, and involved: participatory plant breeding and variety selection, seed supply systems and local markets, and undomesticated and semi-domesticated biodiversity. The other themes stood for more general approaches involving: gender, mainstreaming the CBDC approach, and policy issues. These themes, each coordinated by a focal person, improved the sense of cohesion between international partners on the various subjects, but fell short in terms of joint collaboration, requiring further adjustments in coordination, communication and in overcoming of language barriers.

13. Pre-selected networks not analysed in this study

PRO*MUSA*. Global Programme for *Musa* Improvement. PRO*MUSA* is a broad based programme which aims at involving all the major players in *Musa* improvement. It was developed as a means to link the work carried out towards addressing the problems of export banana producers, with those initiatives directed towards improving banana and plantain production at the subsistence and smallholder level. The programme is a mechanism to bring together research carried out both within and outside the CGIAR, creating new partnerships between National Agricultural Research Systems (NARS) and research institutes in both developing and developed countries. The formation of such partnerships will also contribute to strengthening the capacity of NARS to conduct *Musa*-related research. The major thrust of PRO*MUSA* is to develop a wide range of new banana hybrids suitable for production by banana growers world-wide. The programme brings together conventional breeding based on hybridisation techniques with genetic engineering and biotechnological breeding approaches. The network can be characterised as research-oriented and focussing on utilisation. It brings together partners from developing countries and developed countries. Funding and secretarial support come from the INIBAP programme of IPGRI.

WBN. World Beta Network. In 1989, IPGRI launched the concept of self-sustaining crop networks. The World *Beta* Network (WBN), which was founded the same year, served as a model crop within the framework of the new concept. The WBN is a voluntary association receiving scientific input and financial support from various partners from the public and commercial sectors. WBN has been instrumental in facilitating progress of research on the genus *Beta* and the utilisation of exotic germplasm.

The International Beta Database (IDBB) has been maintained by the Genebank of the Federal Centre for Breeding Research on Cultivated Plants (BAZ), Germany since 1996. The IDBB serves as the central link within the World Beta Network (WBN). The database contains passport data of approximately 11,000 accessions representing the Beta collections from 24 countries located in the northern hemisphere with a focus on European contributors. The structure of the database follows the principles of the IPGRI/FAO Multi-Crop Passport Descriptor list.
This network has strongly focussed on building a crop database as a modest effort. Its objectives and operational principles are not widely publicised.

ECABREN. Eastern and Central Africa Bean Research Network. ECABREN emerged officially in September 1996 from the merger of two regional networks: RESAPAC (Réseau d'Amélioration de *Phaseolus* en Afrique Centrale) working in the Great Lakes Region of Central Africa (Rwanda, Burundi, and Congo ex-Zaire) and EABRN (East Africa Bean Research Network) which operated in Uganda, Kenya, Tanzania, Ethiopia, Sudan, Madagascar, and Mauritius.
ECABREN aims at 'contributing to improved nutrition, food security, income and community empowerment for poverty alleviation, and in a sustainable manner in eastern and central Africa.'
One of the Network outputs is the number of bean varieties released in each of participating countries. Most of the National Programs are profiting from regional collaboration to import varieties developed in other countries and to screen them under their environmental conditions and major biotic and abiotic stresses. The network takes an integrating approach, combining efforts into genetic and non-genetic improvements, and technical and socio-economic approaches.

CBN. Cassava Biotechnology Network. The CBN was a network of cassava researchers and end-users united by the goal of mobilising the development and application of biotechnological tools to enhance the value of cassava in the food security and economic development of the world's poorest rural areas. The Network operated along three major and complementary thrusts: (1) Priority setting and evaluation through the strategic use of social science to ensure that cassava end-users have a real voice in the development and implementation of biotechnologies; (2) Technology diffusion by further adapting key biotechnologies, together with small farmers, through public-sector research; and (3) Information to promote awareness building and dialog among scientists and end-users on biotechnology's inherent opportunities and constraints. CBN now operates on a minimal structure,

comprising a Co-ordinator at CIAT, who provides a pivot for contacts, information, and other communications, and manages the CBN's Small Grants Scheme; a Steering Committee or governing body that sets network policy; and a Scientific Advisory Committee that provides technical program guidance and peer review. The earliest form of CBN as a network was the Cassava Advanced Research Network (CARN), founded in 1988. It has since then evolved through the globally structured Cassava Biotechnology Network (CBN) of 1992 to 1998 to the present regional CBN for Latin America and the Caribbean (LAC). Although its goals have remained constant over the years, the methods for achieving them in the most efficient manner possible have continued to evolve.
The network focussed on research and utilisation. An interesting feature of the programme is its flexibility and its survival under much more modest funding in the latest years. Continued support comes from CIAT.

CLADES. Latin American Consortium on Agro ecology and Sustainable Development. CLADES is a collaborative effort of Latin American NGOs to prevent the collapse of peasant agriculture by transforming it into a more sustainable and productive enterprise. The broad goal of CLADES is to be accomplished mainly by developing and spreading new agro-ecological options for small-scale farmers, and training the staff of their member NGOs in these new methods. Research, training, and information exchange are the heart of CLADES. As relatively small institutions in their own right, member NGOs have asked CLADES' Secretariat to assist with institutional development, including topics such as management systems, personnel policies, and evaluation techniques. More recently, CLADES has also been asked to extend its work to preparing and advocating improved macro-policies around national agricultural planning.
As a network CLADES was broadly focused on agro-ecology as a topic and on capacity building as an activity. It is no longer active but had major political influence and contributed to the emergence of the CBDC programme (see above).

ANNEX 2. QUESTIONNAIRE REGARDING THE FUNCTIONING OF PLANT GENETIC RESOURCES NETWORKS

Regarding network: ……..

1. NETWORK ANALYSIS

1.1 All networks have their strengths and weaknesses. How do you think that your network scored on the following aspects? Indicate at a scale of 1-5 your opinion (5 being excellent, 1 being poor)

definition of purposes and objectives	1 2 3 4 5
priority setting process in the network	1 2 3 4 5
number of activities	1 2 3 4 5
quality and quantity of outputs	1 2 3 4 5
use of outputs by network members	1 2 3 4 5
training activities within the network	1 2 3 4 5
number of active member organisations	1 2 3 4 5
number of active individuals	1 2 3 4 5
quality of network management	1 2 3 4 5
composition of a steering committee	1 2 3 4 5
quality of secretarial support	1 2 3 4 5
logistic and other support by umbrella organisation	1 2 3 4 5
actions undertaken to secure external funding	1 2 3 4 5
volume of in-kind contributions by members	1 2 3 4 5
sense of ownership on the network by network members	1 2 3 4 5

quality of internal communications	1	2	3	4	5
political support	1	2	3	4	5

1.2 Which of the above factors contributed most to the success of the network in your opinion?

1.3 What made the network successful in these factors?
(Did the network follow a specific and/or conscious strategy on these factors?)

1.4 Which of the above factors were the most weakly developed in your network?

1.5 Could you explain what has been undertaken in the network to correct for these weaknesses, and what you see as the outcome of those attempts for correction?

1.6 Could you provide us with a short statement that explains your personal perspective on the role and functioning of your network? For example, you might focus on major developments over time, major external conditions, or major decisions within the network, major groups or persons in the network or external stakeholders that all have influenced the functioning of the network.

2. NETWORK COORDINATION

2.1 Do you consider that the purpose and objective(s) of the network are clearly defined and agreed upon by members?

2.2 Could you provide us with an official document (preferably by e-mail) stating the scope and objectives of the network?

If this is electronically available, please mention website and webpage here

2.3 Could you provide us with the most recent workplan of your network, with details of responsibilities, resource commitments and time frames (preferably by e-mail)?

If this is electronically available, please mention website and webpage here

2.4 Could you provide us with the minutes of the last meeting of the Steering Committee of your network (preferably by e-mail)? (If the minutes are confidential, we herewith guarantee you to keep them confidential and to only use them for the purposes of this study.)

If this is electronically available, please mention website and webpage here.

2.5 Is the leadership of the network elected by participants or appointed? Do you consider this to be a factor in the success of the network?

2.6 What type of organization hosts the network coordination unit? Select one:

IARC	☐
Regional Organization	☐
NARS	☐
NGO	☐
Other (Please specify)	☐

3. SELF ASSESSMENT MECHANISMS

3.1 Does the network have mechanisms for assessing the changing needs of the members/users? Please specify type of assessment:

Needs assessment questionnaire to members	☐
Consultation visits to member countries to assess needs	☐
Project meetings to discuss and agree on priorities	☐
Steering Committee priority setting	☐
Donor meetings	☐
Other (please specify)	☐

3.2 Which of the above assessment mechanisms has been most effective in identifying changed needs of members and has contributed most to resolving weaknesses in the network?

3.3 Could you provide us with the latest assessment report(s) (preferably by e-mail) (If the reports are confidential, we herewith guarantee you to keep them confidential and to only use them for the purposes of this study.)

If this is electronically available, please mention website and webpage here

3.4 Does the network have a system in place to monitor and evaluate its results/outputs? If yes, please give details on the type of evaluation:

Annual meeting reports	☐
Steering committee reviews	☐
Donor reviews	☐
Other (please specify)	☐

3.5 Has your network at any time considered to adopt strategies of other PGR networks to improve its functioning? If so, could you explain why, how and with which result?

4. MEMBERSHIP

4.1 Are there formal agreements between network members and the network? If so, at what level are these agreed:

Individual scientist	☐
Individual research centre	☐
Departmental level within Ministry	☐
Ministerial level	☐
Other (Please specify)	☐
No formal agreement exist	☐

4.2 Does the agreement require a formal commitment of resources by members? If so, please specify those resources that are included in the membership agreements:

Staff time	☐
Research facilities	☐
Membership dues	☐
Hosting of network meetings	☐
Counterpart and co-financing funds	☐
Other (Please specify)	☐
No formal commitment is required	☐

4.3 How many members were registered by the network in 2003?

4.4 Is the membership of the network stable? Select one:

Very stable	☐
Stable	☐
A lot of rotation	☐

4.5 Is the network dominated by members coming from specific sectors? If so, please select those that apply:

Government ministries	☐
Extension services	☐
NGOs	☐
Farmer organizations	☐
Private breeding industry	☐
Research institutions	☐
Others:	☐

5. NETWORK COLLABORATION

5.1 Could you indicate the extend to which you agree or disagree with the following statements (please select only one rating for each statement):

	Strongly agree	Agree somewhat	Disagree somewhat	Strongly disagree
Network goals are well understood and shared among network members				
Network members perceive tangible benefits from participating in the network				
Responsibilities for network activities are shared among network members				

5.2 How often does the steering committee meet to define objectives, validate overall principles and define work programmes? Do you consider this to be sufficient to stimulate and maintain collaboration among members and between (sub)networks?

5.3 How often do working groups meet for technical collaboration, sharing scientific concerns and research results? Do you consider this sufficient to stimulate and maintain collaboration among members and between (sub)networks?

5.4 Could you rate the degree of duplication between the network and other networks? Please specify the other networks.

Other network	A lot of duplication	Some duplication	Little duplication	Not sure

5.5 Please rate the effectiveness of the network in collaborating with other networks. Specify the other networks.

Other network	Very effective	Somewhat effective	Not very effective	Not sure

6. NETWORK FUNDING

6.1 Could you indicate the different sources of funding support for your network (please tick those that are applicable):

Source of funding	**Category of support**				
	Staff time	Facilities	Hosting	Financial resources	Other (please specify)
Member contributions					
Bilateral donors					
Multilateral government donors					
Development banks					
Foundations					
Private companies					
Self generated income					
Other (please specify)					

6.2 What proportion in % of total funding of the network is contributed by the members?

6.3 What types of activities of the network are funded by the member contributions?

6.4 To what degree is external funding channelled towards activities that help the network meet its goals, objectives, and established programme of work?

7. NETWORK OUTPUTS

7.1 Please indicate the major outputs of the network and the amount of output in the past five years (tick all that apply):

Outputs	**High**	**Medium**	**Low**
Information services			
Publications			
Collaborative research			
Training			
Other (please indicate)			

7.2 Does the network maintain one or more central crop databases?

7.3 How many collaborative research programmes were active within the network in 2002? What areas were addressed by these programmes?

7.4 Approximately how many publications were produced by the network in 2003

7.5 What subjects were covered (please tick all that apply)?

Findings of collaborative research activities	
Steering committee meeting proceedings	
Technical working group proceedings	
Network newsletters	
Other (please indicate)	

7.6 Approximately how many training programmes were carried out and how many people were trained by the network in 2003?

7.7 What topics were covered by the training in 2003?

8. OTHER COMMENTS

8.1 Are there any other remarks you wish to make on the functioning of your network, the functioning of PGR networks in general, or this questionnaire?

LIST of KEY INFORMANTS ON
PLANT GENETIC RESOURCES NETWORKS

Regarding network: ……..

Category	**Name**	**Affiliation**	**Contact details** (preferably e-mail and telephone)
government			
breeding institutes and universities			
breeding industry			
extension services			
farmers' organisations and NGO's			

ANNEX 3. NETWORK LIST OF CONTACT PERSONS

Network	Contact Person	Email
Regional Networks		
ECP/GR	Mr. Lorenzo Maggioni	l.maggioni@cgiar.org
SPGRC	Dr. Charles Nkhoma	spgrc@pop3.zamnet.zm
CATCN-PGR	Ms. Muhabbat Turdieva	m.turdieva@cgiar.org
SABONET	Ms. Yolande Steenkamp	Steenkamp@nbi.ac.za
Crop-specific Networks		
COGENT	Dr. Pons Batugal	p.batugal@cgiar.org
LAMP/N	Dr. Suketoshi Taba	s.taba@cgiar.org
INGER	Dr. Edwin Javier	e.javier@cgiar.org
SAVERNET	Dr. (Sundar) S. Shanmugasundaram	sundar@netra.avrdc.org.tw
Thematic Networks		
EURISCO	Dr. Theo van Hintum	theo.vanhintum@wur.nl
SINGER	Mr. Samy Gajii	s.gaiji@cgiar.org
In-situ Oriented Networks		
UPWARD	Dr. Dindo Campilan	d.campilan@cgiar.org
CBDC	Mrs. Angelica Celis	acelis@cetsur.org

ANNEX 4. QUESTIONNAIRE REGARDING THE FUNCTIONING OF PLANT GENETIC RESOURCES NETWORKS

Regarding network: …….

Name & Organization: ……..

Number of years affiliated with the network: ……..

Membership:

Individual	☐
Government	☐
Breeding institute or university	☐
Breeding industry	☐
Extension services	☐
Farmer organization or NGO	☐
Other (please specify)	☐

1. All networks have their strengths and weaknesses. How do you think that the network scored on the following aspects? Indicate at a scale of 1-5 your opinion (5 being excellent, 1 being poor, type bold and/or underline).

ASPECT OF NETWORK	RATING	REMARK
definition of purposes and objectives	1 2 3 4 5	
priority setting process in the network	1 2 3 4 5	
number of activities	1 2 3 4 5	
quality and quantity of outputs	1 2 3 4 5	
use of outputs by network members	1 2 3 4 5	
Training activities within the network	1 2 3 4 5	
number of active member organisations	1 2 3 4 5	
number of active individuals	1 2 3 4 5	
quality of network management	1 2 3 4 5	
Composition of a steering committee	1 2 3 4 5	
quality of secretarial support	1 2 3 4 5	
Logistic and other support by umbrella organisation	1 2 3 4 5	
actions undertaken to secure external funding	1 2 3 4 5	
volume of in-kind contributions by members	1 2 3 4 5	
sense of ownership on the network by network members	1 2 3 4 5	
quality of internal communications	1 2 3 4 5	
political support	1 2 3 4 5	

2. Which of the above factors contributed most to the success of the network in your opinion?

3. What made the network successful in these factors?
   (Did the network follow a specific and/or conscious strategy on these factors?)

4. Which of the above factors were the most weakly developed in the network?
   (Mentioned in the list or question 3 ?)

5. Could you explain what has been undertaken in the network to correct for these weaknesses, and what you see as the outcome of those attempts for correction?

6. Do you consider that the network has benefited you or your organization? What outputs or benefits of the network have directly contributed to your work or the work of your organization?

7. Could you provide us with a short statement that explains your personal perspective on the role and functioning of the network ? For example, you might focus on major developments over time, major external conditions, or major decisions within the network, major groups or persons in the network or external stakeholders that all have influenced the functioning of the network, either positively or negatively.

8. Is there any major change in the mode of operation of the network that you would consider useful to improve its effectiveness?

9. Which two major factors, persons, which if taken away, would seriously affect the robustness of the present network?

10. Are there any other remarks you wish to make on the functioning of the network, the functioning of PGR networks in general, available documents, or this questionnaire?

ANNEX 5. LIST OF DOCUMENTS REVIEWED

ECP/GR

- 7th Steering Committee Meeting Report, 1998
- 9th Steering Committee Meeting Report, 2003
- Terms of Reference for the European Cooperative Programme for Crop Genetic Resources Networks (ECP/GR) Operational Bodies
- ECP/GR Task Force on Priorities for Phase VII, February 2003
- ECP/GR 2002 Progress Report (April 2002-May 2003)
- Lorenzo Maggioni. 2002. The ECP/GR, an Example of Cooperation for Crop Genetic Resources in Europe. Presentation during EAPGREN seminar.

ECP-GR On-line Documents reviewed:
www.ecpgr.cgiar.org

SPGRC

- Mid-term Review of the SADC Plant Genetic Resources Centre Project. August 2002.
- SPGRC/NPGRCs Technical Review and Planning Meeting Report, Sept 2003
- SPGRC Network News, July –December 2003
- Minutes of the 20th SPGRC Board Meeting, Lusaka, Zambia, October 2003
- SPGRC 15th Annual Report, 2003

SPGRC Online Documents reviewed:
www.ngb.se/sadc/

CATCN-PGR

- CATCN-PGR Second Coordination Committee Meeting, 8-9 April 1999, Tashkent, Uzbekistan M. Turdieva and R. Shodmonov, compilers
- CATCN-PGR Coordination Committee Meeting Workplan for 2002-2004

CATCN-PGR Online Documents reviewed:
www.cac-biodiversity.org
http://www.ipgri.cgiar.org/system/page.asp?theme=5

COGENT

- Summary of COGENT Activities 1992-2001
- Report of the Second External Review of the International Coconut Genetic Resources Network, October 2001.
- Summary Report on COGENT evaluation by the Centre-Commissioned External Review Panel.
- Centre Commissioned External Review (CCER) Report. IPGRI's Activities in Asia, The Pacific and Oceania. Excerpts from the report on CO8 (COGENT) 2002.
- Minutes of the 11th Cogent Steering Committee Meeting, June 2002
- Hope for the Coconut. Newspaper Article. The Star, 2001.
- COGENT Membership details
- Cogent News; Stakeholders to Establish a Coconut Research for Development Programme. In: Burotrop Bulletin No, 17, April 2002.
- CGIAR. Report of the Fifth External Programme and Management Review of the International Plant Genetic Resources Institute (IPGRI), March 2003.
- Co-operation between COGENT and BUROTROP. Burotrop Bulletin No. 14, April 2001.
- COGENT Update. COGENT and Partners Initiate Coconut Global Research and Development Programme. Burotrop Bulletin No. 16, December 2001.

- Sajise Percy E. & Pons Batugal. 2000. Strengthening Regional Collaboration in Plant Genetic resources Activities. Paper Presented during the 6th General Assembly of APAARI and the Expert consultation on Strategies for Implementing APAARI Vision.
- Strengthening the South Pacific Sub-Network of COGENT. Presentation during 11th COGENT Steering Committee Meeting, June 2002.

COGENT Online documents and Links:
www.apaari.org/research/net_cogent.php
www.ipgri.cgiar.org/networks/cogent

SABONET

- Inventory, Evaluation and Monitoring of Botanical Diversity in Southern Africa: A Regional Capacity and Institution Building Network (SABONET). GEF/UNDP Project Document. Network Report No. 4. November 1998.
- GEF/UNDP. Logframe for SABONET period 1998-2004.
- Minutes of the 14th SABONET Steering Committee Meeting, November 2004.
- Brian Huntley, Stefan J. Siebert, Gideon F. Smith and Christopher K. Willis. Overcoming the Taxonomic Impediment and Leaping the Digital Divide; the SABONET Experience in Technology Transfer. Paper presented during Trondheim Conference: Technology Transfer and Capacity Building.

SABONET Online Documents and Links:
www.sabonet.org/about/index.html

EURISCO

- EURISCO; Finding Seeds for the Future. Brochure, September 2003
- EPGRIS Project Final Report

EURISCO Online Documents and Links:
www.ecpgr.cgiar.org/epgris/index.htm

LAMP/N

- General Description of the Plan and Execution of Latin American Maize Project (LAMP). By Ing Ricardo Sevilla and Dr. Wilfredo Salhuana. 1996.
- The US. Germplasm enhancement of Maize (GEM) Project. By Dr. Linda Pollak. Coordinator U.S. Germplasm enhancement of Maize USDA-ARS. 1996.
- Contract and Memorandum of Understanding: Cooperative Project of Regenerating and Conserving Maize Germplasm Accessions.
- Crop Germplasm Committee for Maize (USA); abstract and Recommendations. 1995
- Salhuana W., L.M. Pollak, M. Ferrer, O Paratori and G. Vivo. 1998. Breeding Potential of Maize Accessions from Argentina, Chile, USA, and Uruguay. Crop Sci 38:866-872.
- CIMMYT. Cooperation Rescues Seed of Latin American Maize Landraces.
- Suketoshi Taba. Latin American Maize Germplasm conservation: Core Subset Development and Regeneration. Proceedings of a Workshop held at CIMMYT, June, 1998
- Proceedings of Principal Investigators meeting, 2003
- LAMP Final Report. 1997. By Dr. Wilfredo Salhuna, Ing Ricardo Sevilla, Dr. Steve A. Eberhart.

LAMP/N Online Documentation and Links:
www.cimmyt.cgiar.org/resources/obtaining_seed/plant_genetic_rc
www.public.iastate.edu/~usda-gem/

INGER

- INGER Code of Conduct
- Minutes of the 6th Annual Meeting of CORRA, September 2002.
- Update on INGER Activities (2002-2003) by Edwin L. Javier
- WARDA The Africa Rice Center

INGER Online Documents and Links:
http://www.warda.cgiar.org/warda1/main/Partnerships/ingerAfrica.htm
www.apaari.org/research/net_inger.php
www.irri.org/GRC/GRChome/Home.htm

SAVERNET

- ADB. 2000. TA Completion Report of TA 5719-REG: South Asia Vegetable Research Network.
- Tsou S.C.S. & S. Shanmugasundaram. 1998. AVRDC's Global Vegetable Network Strategies. World Conference on Horticultural Research, 17-20 June.
- Minutes of Steering Committee Meeting, June 2001.

SAVERNET Online Documents and Links:
www.apaari.org/research/net_savernet.php
www.arc-avrdc.org/html_files/regional6.html

SINGER

- Main outcomes of ICWG-GR 2003 and items for 2003 SGRP Work Plan.
- SINGER Brochure. Knowledge Makes the Difference, 2002
- Annual Report 2002, of the CGIAR System-wide Genetic Resources Programme

SINGER Online Documents and Links:
www.ipgri.cgiar.org/programmes/sgrp/homesinger.htm
www.singer.cgiar.org/

UPWARD

- UPWARD Overview of Programme Activities and Accomplishments
- UPWARD 2002 Technical Cooperation Report; Summary of Evaluation by CIP Program Management Team (Office of the DDG-Research)
- Castillo Gelia, Keith Fuglie & Anke Niehof. 2002. Synthesis Presentation From The UPWARD Advisory Committee. Proceedings UPWARD 2002 Network Meeting.
- Tentative 2004 Research Workplan: UPWARD Network
- UPWARD-DSN. 2003 Opportunities for Student Research/Practicum
- UPWARD/CIP. 2003. Capacity Development for Participatory Research and Development in Asia.
- Hardon, Antine & Anke Niehof. Lessons from the Past, Strategies for the Future: Linking the Dutch Support Network to UPWARD, A Collaborative Learning Process.
- UPWARD Brochure
- Campilan, D. 1999. Preface: Introducing a livelihood systems framework for participatory agricultural research. In Learning to Manage Livelihoods: New Perspectives in Rootcrop R&D. CIP-UPWARD, Los Banos, Laguna, Philippines. xiii-xxii.
- Participatory Research at CIP. Report of an Internally Commisioned External Review. By Douglas Horton, Daniel Selener and Adiel Nkonge Mbabu

UPWARD Online Documents and Links:
www.eseap.cipotato.org/upward/

CBDC

- CBDC. 2002. Mid-Term Evaluation of the Community Based Biodiversity Conservation (CBDC) Programme during its Second Phase. Prepared by Ms. Monica Moore & Dr. Melaku Worede.
- Gigi Manidad. 1996. Biodiversity Conservation and Development: The Collaboration of Formal and Non-Formal Institutes. Biotechnology and Development Monitor. No. 26.
- CBDC Brochure 2003.
- Minutes of PCC meeting, December 1-2, 2003.

CBDC Online Documents and Links:
www.cbdcprogram.org