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National Agricultural Research Centre: Master Plan Implementation

A Consultancy Report

by

Guy B. Baird

March, 1990

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The MART (Management of Agricultural Research and Technology) Project is funded by the United states Agency for International Development (USAID). The MART Project's chief link to the Government of Pakistan is through the Pakistan Agricultural Research Council (PARC). A MART Project Coordination Committee composed of federal, provincial, and university representatives coordinates and guides project activities. Its purpose is to assist the Pakistani agricultural research system to strengthen its research management capabilities, and to improve communications, training, farming systems research, arid zone research, and research in the rural social sciences. Winrock International, through a contract with USAID, has responsibilities to assist with the first four of these tasks. Two international agricultural research centers, the international maize and wheat improvement center (CIMMYT) and the International Center for Agricultural Research in Dry Areas (ICARDA), are responsible for the other two tasks.

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PREFACE

The consultant was last in Pakistan about 15 years ago at which time he was taken to the site selected for the National Agricultural Research Centre (NARC). It was a great surprise to return to the site and see the impressive campus and experimental farm. The country has reason to be proud of this key facility and its staff, and also expects that much good will result from the research done there. NARC has a challenge to utilize this fine center to the utmost for its intended purpose.

It has been an opportunity and pleasure to associate with NARC and Pakistan Agricultural Research Council (PARC) in developing plans and procedures for implementation of the first stage of the NARC Research Master Plan. The timing may not have been optimal since there was an interregnum at NARC, except in the first week or so. The then incumbent Director General retired and the post remained vacant through the period of assignment of the consultant. Thus, regrettably, there was no opportunity to work with the person who will bear greatest responsibility for implementation of the Master Plan.

Nonetheless, excellent collaboration was extended by both PARC and NARC. The consultant wishes, in particular, to acknowledge the encouragement and guidance provided by the Chairman of PARC, and expresses appreciation to him for having assigned Dr. A. A. Hashmi to work with the consultant during the latter part of the assignment. Other Members also were helpful, notably Dr. Hanif Qazi.

At NARC many persons shared their views about implementation of the Master Plan and their inputs were very helpful. In particular, the consultant recognizes the contributions of Dr. M. Yousaf Chaudhri, Mr. Zahoor Ahmad Malik, Mr. Bashir Ahmad Malik, Dr. N. I. Hashmi, and Mr. Abdul Qayyum. Mr. Qayyum was associated with the consultancy throughout, arranging meetings and providing valuable information needed to complete the assignment.

The MART staff provided excellent support and their role is appreciated. In particular, the consultant thanks Dr. Murray Lawson for his untiring assistance.

EXECUTIVE SUMMARY AND ADMINISTRATIVE ACTIONS

The purpose of this assignment was to assist the Director General of the National Agricultural Research Centre (NARC) and his appointed committees to develop a plan and procedures for first-stage implementation of the NARC Research Master Plan. Prior to the arrival of the consultant, both NARC and the Pakistan Agricultural Research Council (PARC) had requested scientists to identify from among the 400-odd prioritized projects in the plan those with highest priority for implementation at this time. In particular, it was intended to isolate those proposed projects holding greatest promise for early payoff - tangible outputs within the next 1-3 and 3-5 years.

The resulting list, aside from including far too many nominations, presented a number of problems. Material included with most of the proposals was inadequate to carry out an objective assessment of their priority and promise. There was also a recurring problem of inclusion in the proposals of those which are not properly part of the research under the NARC mandate. In particular, much of the work directly under coordinators of the nationally coordinated research programs was presented as part of NARC's research. There is a need to clearly define the role of the national coordinators in contrast to the roles of the scientists at NARC working on the same commodities or problems.

A suggested checklist was developed as a means to systematically and more objectively prioritize proposed projects. Although used illustratively in the report, inadequate information was available, for reasons mentioned, to fully carry out the exercise with the checklist. This led to development of a basic format for project formulation which, if used as envisaged by scientists, would enable NARC's review groups (Technical Working Group and Research Committee) to objectively rate and prioritize projects. Need for such exercise is necessary to insure more efficient allocation of scarce resources, and as a means to solicit additional support from the government and from other donors. Both need to be convinced that NARC has determined highest priority projects likely to pay off in the short run, and is allocating resources accordingly.

Project reporting is discussed in relation to monitoring and evaluation, and measures are recommended to strengthen the Planning Research Monitoring and Coordination (PARC) Unit at NARC.

Successful implementation of projects identified for first stage implementation is contingent on adequate inputs from the several support service units of NARC. Each unit was asked to identify and prioritize requirements and needs in relation to the

first stage period. This information should be the primary basis for allocation of funds to the units.

A section deals with the delegation of administrative and financial authority. It is clear that at this point the major cause for concern is lack of a strong director general at NARC with full authority and support by PARC to carry out the mandate of that centre. Unless this need is met expeditiously, it is hard to imagine how the envisaged first stage implementation of the plan can take place successfully. The director general should not have direct responsibility for all of the administrative and support services at NARC. Thus, in accord with the reorganization of NARC contained in the Plan, the position of deputy director general for administration is recommended.

The last section is about financial implications. This report deals largely with plans and processes: project formulation, prioritizing, reporting, and monitoring and evaluation which, per se, imply no substantial additional funds. Implementation of an approved, prioritized set of projects with high probability of early pay off basically means allocation of funds to favor those projects. This can be done regardless of the funding available. It is a methodology to improve the probability of return on investment in research irrespective of the actual resources available.

Most sections of the report contain one or more recommended administrative actions. The principal ones are as follows:

- A strong director general should be placed at NARC at the earliest, with full authority and support from PARC to carry out the mandate of the centre.

- The post of a deputy director general for administration should be established as a measure to rationalize the centre's management responsibilities.

- Action is urgently needed to identify the high priority projects for first stage implementation. Information required for the prioritization exercise should be obtained through use of a project proposed format along the lines of the one proposed in the report. However, in order to identify those that must be started now, a simpler, interim measure is suggested.

- Funds should be allocated and made available when needed to support the agreed-upon priority projects.

- The PRMC at NARC should be strengthened to enable effective monitoring of progress and evaluation of results.

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1. INTRODUCTION

In 1989 the Pakistan Agricultural Research Council (PARC) released the publication entitled "National Agricultural Research Centre: Master Plan 1988-2000". Volume I is the Research Master Plan. Volume II is the Physical Master Plan.

The purpose of this consultancy is to assist the Director General of the National Agricultural Research Centre (NARC) in development of procedures for implementation of the first stage of the Research Master Plan. The specific terms of reference are included as Annexure I.

There are a number of underlying assumptions inherent to implementation of the first stage of the Master Plan. They include:

- The primary focus is at the project level which has important implications for the first stage implementation;
- All the 412 projects proposed for implementation during the plan period (1988-2000) - even those having a first priority classification (217) - cannot be adequately supported during the first stage (3-5 years);
- Some first priority projects among those listed in the plan are more important to implement during the first stage than others;
- A process is needed to systematically and objectively identify those that should be implemented initially;
- Resources should be allocated based on the priorities;
- Improved reporting and monitoring procedures are needed to optimize prospects for successful implementation of the selected projects.

Prior to the arrival of the consultant the Planning Research and Monitoring Cell of NARC (PRMC) had requested program and project leaders to provide information about proposed projects to be implemented during the first stage of the Master Plan. It was learned later than PARC had undertaken an exercise of similar nature, resulting in a list of projects deemed to be most promising by the various program leaders. The information obtained through these two exercises constituted the focal point of subsequent discussions between the program/project leaders and the consultant.

Prior to meetings with individual program/project leaders, the consultant had the opportunity to meet with the Chairman, PARC, and the Director General of NARC and his Executive Committee. This was followed by meetings with a) The Deputy Director, PRMC, and the Farming Systems Research Specialists of the Management of Agricultural Research and Technology Project (MART); b) the Master Plan Writing Team and c) the Deputy Director of Administration and Heads of the several support service units. A more complete list of persons met or interviewed is included as Annexure II. There were additional meetings early on with the Chairman of PARC and members of the USAID Mission directly concerned with MART.

The key reference used in this consultancy was the Master Plan itself. However, valuable insights were obtained from several other documents, notably:

- NARC Annual Budget: 1989-1990
- Internal Management Review of NARC. March 1988.
- Consultant's Report on the Research Master Plan. McClung and Eisgruber. October 1988
- PARC Annual Report. 1988
- Pakistan's National Coordinated Research Programs. E. T. York. June 1987.
- Training for Agricultural Research in Pakistan. Frank C. Byrnes. September 1988.

Many other consultant reports were helpful, along with valuable materials provided by the Planning Research, Monitoring and Coordination Cell (PRMC) of NARC.

Meetings with individual program/project leaders extended over a substantially longer period than anticipated due to unforeseen developments. Further, interviews revealed considerable disparity among the leaders as to the information to be provided. Particularly noteworthy were a) confusion between programs and projects and experiments, b) tendency to aggregate priority projects as listed in the Master Plan, and c) reluctance to do, or unfamiliarity with, detailed budgeting at the project level. None-the-less, these meetings were very useful, hopefully to all concerned (certainly to the consultant), and resulted in most of the findings, conclusions, and recommendations contained in this report.

The report, in response to the terms of reference, is made up of the following sections: 1) projects proposed for first stage implementation, 2) project formulation and approval, 3) reporting, 4) project support, 5) monitoring and evaluation, 6) delegation of administrative and financial authority and 7) training to improve performance.

2. PROJECTS PROPOSED FOR FIRST-STAGE IMPLEMENTATION

2.1. Plan Projects

The Research Master Plan contains the titles of 412 projects proposed to be carried out during the period 1988-2000. The breakdown by broad program/institute and priority is given in the following table:

Table 1. Master Plan Projects

	Program Title	Numbers/ Priority of Projects 1st	2nd	3rd	4th	Sub-Total
1.	Crop Improvement and Production Institute	72	50	16	3	141
2.	Plant Protection Institute	25	18	4	9	56
3.	Animal Sciences Institute	37	25	13		75
4.	Soil and Water Institute	54	26	9		89
5.	Social Sciences Institute	18	14	2		34
6.	Farm Machinery and Farming Systems Research	11	3	3		17
	Total:	217	136	47	12	412

Further breakdown by programs (e.g. by crops and animal species) and by priorities is given in Annexure III.

The Plan also has summary tables at the end of each research program containing details of yearly research requirements for the overall period (1988/89 - 1999/2000). Included are number of scientists and operational funds. Lack of both staff and financial resources makes it imperative to select from among the 412 proposed projects those that are to be dealt with on a priority basis during the first-stage implementation of the Plan. Thus, the scientists were requested to submit information on those projects deemed by them to be of highest priority.

2.2 First-Stage Projects and Priorities

A listing of the proposed stage-one projects is given in Annexure IV. In a few cases, material was not received with titles for the first-phase projects. In such cases, the first priority projects cited in the Master Plan are given. The first page of Annexure IV is in the form of a checklist with a listing of the first few project titles. Thereafter, only abbreviated project titles are given.

The checklist, containing only one project for each of the major programmes/institutes, is given in Table 2. These projects were selected for purposes of illustration and have no necessary relevance to priority of projects proposed for first-stage implementation. One project, arbitrarily chosen to use as an example, is partially rated by the consultant to illustrate use of the checklist factors.

The checklist, arrived at after considerable discussion is neither comprehensive nor are the factors intended to be in order of importance. However, they do constitute a manageable and adequate set of criteria for assessing project proposals from a number of view points.

The project "Basmati improvement through innovative means" is used as the example to illustrate and explain the intended use of the checklist. The assumption was made that this project is of a relatively basic research nature - it goes beyond conventional plant breeding techniques, using the tools of biotechnology. Ratings for most factors are in terms of "high"(H), "low"(L) or "medium"(M) to simplify the process. The weighted priority rating was felt to be more easily handled by a numerical rating: 1=low; 5=high.

The first two ratings concern the appropriatenes of the research as related to NARC. In the first instance, will the agro-ecological setting of NARC be a matter of important concern? Basmati rice is not grown in/suited to this part of the country so if the proposed research depended heavily on field based research, if would not be appropriate to carry out at NARC. Thus a rating of "L" for the first factor. Since, however, it is assumed that the proposed project contemplates work to be carried out under more controlled conditions (e.g. laboratory or growth chamber), it seems to very well fit NARC's mandate, thus a rating of "H".

If the project is successful what is likely to be the impact? Or, how important is the problem to be addressed by the proposed research? It is difficult to rate this factor in the absence of a clearer picture of just what the scientist expects to accomplish during the project period. Is it improved technology that can be used by other scientists? Or is an improved variety per se the product? An arbitrary rating of "M" is assigned.

A checklist of priorities among NARC research projects
for first-stage implementation - an example

Programme, Project	Fit to NARC Agro-Ecol	Fit to NARC Mandate	Potential Impact	Work at Other Centres Pakistan	Work at Other Centres Abroad	Prob. Output Attainment 1-3 yr.	Prob. Output Attainment 3-5 yr.	Interdisc. Nature	Staff Avail.	Cost Estimate	Weighted Priority 1-5
	(H=High, L=low, M=Medium)									(Rs.mill)	(1=Low;5=high)
1. CROP PRODUCTION											
1.2 Rice											
1.2.3 Basmati imp./ innovative means	L	H	M	L	H	L	M	H-M	H(?)	?	?
2. PLANT PROTECTION											
2.1 Pathology											
2.1.4 Damping off Brassica rapis											
3. ANIMAL SCIENCES											
3.7 Animal Nutrition											
3.7.1 Feeds based on crop residues/ agro-industrial by products (UMR)											
4. NATURAL RESOURCES											
4.4 Water Resources Management											
4.4.1 Integrated land and water use for barani area											
5. AGRICULTURAL MACHINERY											
5.1 Harvesting											
5.1.1 Harvester for oilseed crops											
6. SOCIAL SCIENCES											
6.1 Agricul. Econ.											
6.1.1 Risk management											

BEST AVAILABLE DOCUMENT

It is assumed that little or no work on basmati rice along the lines proposed is being done in the country, thus a rating of "L" for work at other centres in Pakistan. On the other hand, there is an international network of research directed to rice improvement using the tools of biotechnology. Thus, a rating of "H" is given for work at centres abroad. These ratings relate to two important issues in project review a) unnecessary duplication of ongoing work, and b) opportunities for collaboration. Opportunities at NARC are expanding rapidly which enable scientists to keep current with related research on an international basis.

The next factor concerns the probability of attainment of project outputs/projects within a given time frame. Since the project on basmati rice is of a more basic nature, output may be problematical during the first 2-3 years, but again, it really depends upon how the scientist defines or specifies the planned outputs. Arbitrarily, a rating of "M" is given for the shorter span. A some what higher rating is given for the 3-5 year period- "M_H".

Many, if not most, projects tend to be of an interdisciplinary nature. In other words, the problem does not conform to a single discipline approach. Thus, all proposed projects should be viewed in this context. The basmati rice project would seem to need to involve at least the disciplines or subjects of plant breeding, cytogenetics and tissue culture. Thus, a rating of "H".

In the absence of full information about the involved staff-number and experience - a provisional rating of "H" was given for this factor.

No details were available about proposed budget, so this statistic was left blank.

Likewise, in the absence of much information needed to prioritize the project proposal, there was no rating for the "weighted priority".

Two observations are in order related to the attempt to complete the checklist for even a few proposed projects:

- Adequate information was not available to satisfactorily complete the checklist. The next section of this report deals with project formulation.

- A well-understood procedure is needed to carry out the checklist exercise. In this case the exercise, incomplete even in the few cases selected, was purely for illustrative purposes. The ratings should be by way of the usual NARC review process, i.e., by the Technical Working Groups (TWG) and the Research Committee, in that order.

The list of projects also appears to reflect a lack of clarity regarding the role of NARC vis a vis the national coordinated research programs. These coordinated programs, per se, are not the responsibility of NARC. However, NARC may be responsible for executing certain components/projects of any given program. The national coordinator is administratively responsible to the concerned member of PARC in his coordinating role rather than to anyone in NARC. There is need to clarify this issue. The report by Dr. E.T, York (1987) is an excellent reference.

Administrative Actions:

On the basis of the foregoing, a number of actions are recommended to be taken by NARC:

- Use a checklist along the lines of the one suggested to more systematically and objectively prioritize projects;

- Have the Technical Working Groups review the long list of proposals with the objective of reducing overlap, separating components of national coordinated programs that are not properly NARC activities, clarifying objectives, etc. This would result in a much shorter and better list of candidates for first stage implementation;

- Ask for proposals for each project remaining on the revised list. In the next section of this report a suggested format for project formulation is presented and discussed. (Urgency to initiate implementation of some of the first stage projects may dictate an abbreviated procedure, e.g., selection of clearly high priority candidates by the TWGs and/or the Research Committee);

- With the proposals or candidates in hand, have the Technical Working Groups, and then the Research Committee, rate each project per the checklist; and

- Request the Board of Management to approve the projects given highest priority for first stage implementation, consistent with availability of funds. The temptation should be resisted to inadequately support those that have come out on top in the ratings. Inadequate funding of a large number of projects can be expected to result in poor performance.

3. PROJECT FORMULATION AND REVIEW

3.1 The Problem:

The information initially requested from the program/ project leaders on projects for the first stage implementation of the Master Plan proved to be inadequate. In other words, from what was

submitted the prioritizing checklist could not be completed satisfactorily, even for the selected projects shown in Table 1. Thus, Technical Working Groups and the Research Committee need fuller documentation in project proposals in order to determine priority and recommend implementation.

Specifically, the following information was generally lacking in information obtained from all of the research units:

- Specific objectives and planned outputs tied to the objectives. This information is needed to enable NARC to: 1) decide as to the fit of the proposed work to the agro-ecological zone where NARC is located, and of the relevance to the NARC mandate; 2) estimate the probability of achieving the outputs within the specified time frames (e.g. 1-3 years and 3-5 years); and to judge the potential impact of the work done at NARC under the proposed project.

- Related work within NARC, other NARC centres, other units within the national agricultural research system and institutions abroad. This enables the reviewers to determine if the proposer is aware of what others are doing, is not duplicating their work, but building on such work. There seems to be little reason why the scientists should not be aware of related work and workers within the country. And, it is increasingly easier to get such information on a worldwide basis. In this connection it is appropriate to refer to the project "Strengthening of Selected Agricultural Libraries and Documentation Centers in Pakistan." Under this project, computers, floppy discs, software programs and CD-ROM will help scientists to quickly search scientific literature for relevant research.

- Understanding as to how the researcher views utilization of the outputs by the intended users (e.g. by other researchers, extension and private sector enterprises), and how the scientist has and will interact with the intended users before and during the course of implementation.

- Interdisciplinary nature. There is need for more specificity, instead of being tentative and general. Evidence is needed to show that meaningful discussions have been held and intents reached with scientists in related disciplines, within the country, and abroad as appropriate.

- Inputs. The proposed staff and the percentage of their time to be spent on the project are needed. A scientist may not be full time on just one project; he or she may

also be responsible for more than one, or be responsible for one and collaborate with other projects within NARC. This procedure is important to account for time spent by the scientist, thereby enabling the management of NARC and PARC to know the manpower devoted to specific problems, disciplines and commodities. It is an important element in multi-year planning for staff needed and for training requirements. Training needs and travel requirements are important to project implementation and should be identified. It is, of course, important to clearly identify relatively expensive items such as special equipment and materials. Assistance from the NARC support service units should be specified.

- Budget. Seemingly more attention needs to be given to realistic budgets. This can be done if the budget stems directly from a more detailed identification of inputs, as noted above. Particular attention should be focussed on the operational budget.

3.2 A Suggested Format

In view of the foregoing, a format for project proposals was developed and is presented for consideration and use, either in the form shown, or as modified to better suit the conditions of NARC. This format is given in Annexure V.

It contains the following headings:

1. Title
2. Objective(s)
3. Problem
4. Previous and Present Work
5. Methodology/Approach
6. Specific Outputs (Products) Anticipated
7. Utilization of Outputs
8. Collaboration
9. Inputs Requirements
10. Budget

The title should be short and concise, reflecting the principal objectives of the proposed research.

The objective, or objectives, should be sharply-focussed and realistic, taking into account what can reasonably be expected to be accomplished during the time-frame of the proposed project.

There should be a clear statement of the problem to be addressed by the proposed research, and the potential impact of project success on the national agricultural economy (area affected, value of product/resource, demand, urgency of need, distribution of benefits).

The statement on previous and present work should make clear the most relevant research and results. It should demonstrate the familiarity of the proposer with such work and key researchers. Long literature reviews with much marginally-related material should be avoided. Attention should be given to work: a) within NARC; b) outside of NARC, but in Pakistan, and c) outside of Pakistan. This statement should make clear what additional work is needed to solve the problem, and make equally clear that what is being proposed does not duplicate past or present work.

The part on methodology/approach describes how the research will be carried out to obtain the additional information/ technology needed to solve the problem.

The outputs/products anticipated flow from the objective(s). They should be specified for each objective and in concrete terms (information, technology, publications, etc.). Some outputs (i.e., from on-going projects, or even from new projects) may be achievable well before the projected duration of the project. Thus, both shorter term (1-3 years) and longer term (3-5 years) outputs should be stated. Further, quantifiable progress indicators should be listed for each planned output. For example, if the output at the end of five years is to be a marketable molasses/urea block as a supplement to cattle feed, what will be the tangible measures of progress during the course of the research? They might include: evaluation of different formulations in experiment station-based tests by end of year 3, and evaluation of most promising formulations under off-station conditions by the end of year 4.

Continuing the example, let us assume that the project on molasses/urea blocks has been successful. A formulation has been developed and tested under field conditions, demonstrating its economic importance as a feed supplement. What assurance is there that the blocks will be produced and marketed on a commercial basis? The proposal should show that the scientist is fully aware of how the research output can be utilized, citing specific potential clients. Some outputs, such as the molasses/urea blocks, would seem to lend themselves to commercialization by the private sector, and should be clearly identified as such.

Inasmuch as most, if not all, proposed projects are related to on-going research within or outside of the country, opportunities should be sought for meaningful collaboration. It may be in terms of achieving the needed interdisciplinary approach required. For example, a project on somo-clonal variation in wheat through embryo and another culture should involve active collaboration with the wheat breeder, or the collaboration may be within the same discipline - two or more researchers working on the same problem - but perhaps with different genetic material, or using different methodology. Further, the collaboration may be with private or public sector entities concerned with commercialization of the

outputs. The proposal should much clear the intended collaboration and show that such collaboration is feasible.

The inputs required to carry out the proposed project should be specified in terms of staff, facilities, equipment and supplies, etc. The Master Plan, Chapter 5 (pp. 200-205) on support services should be used as a checklist for specific services needed for the proposed project. The specific units likely to be involved include:

- Audio-Visual Communications
- Library and Documentation
- Central Store
- Farm Operations and Services
- Transport Services
- Automobile Workshop
- Works, Repair and Maintenance Unit
- Laboratory Equipment and Maintenance Unit
- Training Institute

Inclusion of likely project demands on the support service units can help those units do a better job of anticipating their work load.

Finally a project budget is needed with details of establishment (staff), operational and capital requirements by year. When staff are working on more than one project, time and budget should be allocated on a project-level basis. This enables analysis of manpower and budget allocations based on individual commodities, disciplines, etc.

3.3 Review and Approval of Proposals

The basic review process for proposed projects is described in the Master Plan (p. 191). The proposal is reviewed by a Technical Working Group which, after thorough screening, can decide to:

- Approve as such for further action by the Research Committee;
- Approve with some alterations/improvements and then send onward to the Research Committee; or
- Defer or drop

It is assumed that even before the proposal reaches a Technical Working Group, it will have undergone a certain amount of review by smaller groups within a given institute or program. Further, during the course of the annual workshop of the national coordinated research programs, plans are discussed for the next year which provides an opportunity for a) input to project formulation, and b) discussing proposed projects.

The Research Committee further reviews proposals forwarded by the Technical Working Groups. For those approved, authorization may be given by the Director General for implementation.

3.4 Use of Proposals

The approved project proposal is a valuable document, having a number of continuing uses. They include: 1) formulation of work plans, progress reports, and 2) monitoring and evaluation.

The first work plan (annual?) should relate to the approved proposal, stating objectives and work expected to be accomplished during 1-3 and 3-5 years - realization of the outputs. Quantifiable progress indicators (interim objectives or outputs) should be noted, as well as plans to interact with prospective users of the outputs, and research collaborators. Plans should specify inputs requirements and, when appropriate, timings.

The first progress report should flow from the first work plan. This linking of key indicators/headings right from the approved proposal through work plans and progress reports provides a consistency and facilitates both reporting, and monitoring and evaluation.

3.5 Administrative Decisions

A decision is called for regarding the use of a more suitable format for project formulation. The one suggested incorporates provisions to elicit from scientists the basic information needed by reviews to determine the priority of the proposed work and to enable the Director General of NARC to make decisions about implementation, and allocation of funds.

It is noted that this proposed format is not necessarily intended to replace PC-1, but to supplement it or to serve as the forerunner to the PC-1. It should be relatively easy to later convert the proposal (per the suggested format) to the PC-1 format, if that is required.

4. REPORTING

4.1 The Perspective

The purpose of this section is to relate reports to project work plans, monitoring, and reviews. Good reports flow from a project with clear objectives, and a well thought out work plan with verifiable output and input progress indicators.

It is recognized that PARC has its reporting system which includes annual program reports from NARC. The focus in this section is project-level reporting within NARC. In turn, project reports are consolidated/summarized for use by both NARC and PARC.

As understood, NARC, per se, does not publish an annual report. Rather, its annual accomplishments are incorporated in the PARC Annual Report. So, stated in another way, the purpose of this section is to suggest ways to improve the quality of progress reports submitted by NARC to PARC.

Reporting is commonly viewed as an onerous task by researchers, and thus reports are commonly hastily done and submitted late. However, they probably constitute the single most important means of monitoring and reviewing progress, and evaluating end results. The quality and timeliness of project reports should also be criteria in assessing the performance of the project leader.

Project and program leaders are likely to attach little importance to reports if they are not used effectively for the intended purposes. Too often reports are submitted with little or no feedback. Thus, careful consideration needs to be given to the kind of information and frequency of reports needed to monitor, review and evaluate project-level research. This has already been considered to some extent in proposing a format to be used in project formulation and approval. It will be discussed further in the section on monitoring and evaluation.

The annual project progress report builds on the intervening reports (quarterly or semi-annual), and is important to the annual review and periodic evaluations. When the reports take into account project workplans and budgeting, it is much easier to check progress against planned objectives.

The challenge to NARC is to obtain reports that meet its needs without placing unreasonable demands on the scientists. Unnecessary narrative should be discouraged. In fact, the more frequent project level reports (e.g. quarterly and semi-annual) should not necessarily require a narrative text. A simple, standard format can be used to facilitate preparation of reports while assuring that necessary information is provided. A standard format facilitates monitoring, review and synthesis of project-level information into program-level reports.

A good progress report is also a good basis for the succeeding work plan. Work for the next period flows naturally from the position of the project at the end of the reporting period. Thus, there should be a consistency in reporting formats for progress report and work plans - they should be closely linked.

4.2 A Format

In view of the preceding considerations, what might be a suitable reporting format? Basically, it should stem from the format use for project formulation. Thus, it is suggested that the

format for project proposal formulation, shown in the preceding section, constitute the basis for reporting, including the following headings:

1. Title
2. Reporting period
3. Objective(s)
4. Methodology/Approach - any comments on adequacy or inadequacy or modifications.
5. Progress toward achievements of outputs.
6. Progress toward utilization of anticipated inputs (e.g, interaction with expected users).
7. Collaboration. Specify what has been done.
8. Progress in provision of inputs.
9. Provision of budget.

This format lends itself to both within-year and annual reports. And, as already mentioned, within-year reports can be greatly abbreviated by minimizing or virtually eliminating narrative. In other words, the information is provided in outline or tabular form.

The format would also be used for work plans. Often reports include both the progress report as well as plans for the ensuing period.

4.3 Administrative Decisions

If it is decided to adopt an improved format for project formulation, and a checklist procedure for project review and prioritization, then a consistent format for reporting is in order and recommended.

5. PROJECT SUPPORT

5.1 The Problem

There are serious constraints to implementation of projects once they are approved. These constraints can be considered under the general headings of budget and support services. It is recognized that there is never enough funding to meet the needs of all projects, nor can support services be fully responsive to all on a timely basis. The challenge, then, is to identify ways to:

- Increase the effectiveness of the funds currently available (especially the operational component of project budgets.)

- Demonstrate a more effective use of funds (increased tangible research outputs) as a means to broaden the support base for research.

- Strengthen the support services at NARC to meet the needs of the research programs.

5.2 Research Budget

According to the Master Plan (p. 185) at least 50% of the scientists canvassed at NARC felt that operational funds were inadequate and were not provided on time. This problem is highlighted by looking at the 1989-90 non-developmental research budget. Information is summarized in Table 3, following. Later in this section a complementary table gives the corresponding budget for the support service units at NARC.

Table 3. 1989-90 Non-Development budget for research-NARC (Rs. in millions).

Area	(1) Estab.	(2)* Operat.	(3) Capit.	(4) Total	(5) 2/4%
1. Crop Protection	9.479	3.377	.081	12.937	26.1
2. Plant Protection	2.386	.798	.020	3.704	21.3
3. Animal Sciences	4.679	2.123	.257	7.059	30.0
4. Natural Resources	3.636	1.676	.133	5.445	30.8
5. Agricultural Machinery	2.550	.655	.067	3.272	20.0
Total	23.230	8.629	.558	32.417	26.6

*Does not include residential allowance.

On an average (over the five research institutes/ programs shown), operational expenses constitute 26.6 percent of the total budget. This varies from a high of 30.8 percent for Natural Resources to a low of 20.0 percent for Agricultural Machinery. Perhaps a more meaningful relationship would be given by omitting capital costs in the calculations, i.e. looking only at relationship between establishment and operational components of the budget. However, in these cases the capital component is small and thus has relatively little effect on the ratios of establishment to operational costs.

As would be expected there is a still wider range of relationships of operational to total budgets when looking at projects within the five areas (Annexure IV). For example, in Crop Production the current operational budget for Rice is about 17.2 percent of the total budget. In the case of Vegetable Crops, the corresponding figure is 40.7 percent. In Plant Protection the figure for Entomology is 19.8 percent; that for Virology is 40.1 percent. And, there are corresponding ranges within Animal Sciences, Natural Resources, and Agricultural Machinery.

While there is no hard and fixed guideline or rule, it is commonly felt that something like a 60:40 relationship between establishment and operating costs is a reasonable goal. In other words, operational costs should constitute about 40% of the combined establishment and operational budget. It is understood, however, that considerable variation would be expected among individual programs and projects, depending on their nature.

In any case, there is ample cause to be concerned about the availability of operational funds, based on the 1989-90 budget of NARC. Scarcity of the funds makes it all the more important to identify priority among programs, and particularly among projects proposed to be implemented during the first stage of the Master Plan. Unless there is some allocation of these scarce funds based on priority of research, there can be little expectation of attaining planned objectives.

Apparently there is also a serious problem beyond general availability of operational funds--the actual availability of these funds at the project level when needed. This is recognized in the Master Plan and seems to call for a greater delegation of authority and/or greater exercise of already-delegated authority. More will be said about this later.

Reference should also be made to the 1989-1990 development budget of NARC, details of which are also included in Annexure 5. This budget provides substantial inputs to the programs on pulses, oilseeds, seeds, poultry, livestock and honeybees. There is also support to the Plant Introduction Centre. It includes World Bank support to plant sciences which allows considerable flexibility in enhancement of operational budgets of the concerned programs. Thus, the current total (non-development and development) operational budgets of some programs and projects may be higher than shown in the table giving non-development data. Correspondingly, there may be higher percentages of operational budgets to total budgets. The important point here, however, is that development budget is of limited duration, and unless built into the non-development budget, ceases with the termination of the development project.

The total development budget of NARC for 1989-90 is (Rs. in millions):

(1) Estab.	(2) Operat.	(3) Capital	(4) Total	2/4(%)
17.696	12.316	9.480	39.492	31.2

It is also important to recognize that USAID/Pakistan recently made a substantial contribution to NARC to be used to enhance the operational budgets of research projects.

If NARC is to implement its research role in a commendable manner, the following steps are inescapable:

- Scarce operational funds must be allocated to favor projects identified as having higher priority in implementation during the first stage implementation of the research Master Plan.

- Flexible development project funds (including special grants as from USAID) must be used judiciously to augment scarce operational funds available through the non-development budget.

- PARC and donors must be convinced that NARC is using operational funds based on a sound system of project priorities and resource allocation.

5.3 Support Services

The Master Plan devotes a chapter to this subject (pp. 200-211). The 13 units with brief comments follow.

1. Audio-Visual Communications. Considerable attention is devoted to the mandate, objectives, current program and planned program of this unit. The building is expected to be completed at about the outset of stage-one.

2. Library Services and Documentation. Again, mandate, objectives and program (current and planned) are spelled out.

3. Central Store. No information is given about the current program although the proposed program is specified.

4. Procurement Cell. Recognition is expressed of the need to strengthen this section, but no specific measures are given. The procurement officer has no delegated authorization to make expenditures.

5. Farm Operations and Services. Information on objectives and current and planned programs is missing in the Plan.

6. Transport Service. The information provided is largely descriptive, concentrating on the status of vehicles.

7. Automobile Workshop. This unit is described in one sentence.

8. Works, Repair and Maintenance. No information.

9. Laboratory Equipment and Maintenance. No information

10. Space Allocation. This function is handled by a committee constituted by the Board of Management of NARC. Detailed policy guidelines are presented in the Plan.

11. Germplasm. This consists of two units: The Plant Introduction Center and The Plant Genetic Resources Program. While most of the work of both seems to be of a supportive nature, they are budgeted under the Plant Sciences Institute.

12. National Herbarium. The principal aims are listed.

13. Training Institute. Objectives, mandate, and current and planned programs are specified.

The Plan chapter on Support Services concludes with a table on resource requirements (staff and operational funds for the period 1988/89-1999/2000, but includes information only for Library Services and Documentation.

The core issue faced at this point is the role of the support services in the first stage implementation of the Master Plan. In principle, NARC needs basically the same kind of information as has been described for research projects, to make objective decisions about priorities and allocation of scarce resources to the support service units.

The first step was to look at current resources available to the units. The information compiled is presented in Table 4, following.

Table 4. 1989-90 Budget for Support Service Units - NARC

(Rs. in Millions)

Unit	(1) Estab.	(2)* Operat.	(3) Capit.	(5) Total
1. A/V Comm.	0.811	0.579	0.135	1.525
2. Lib & Doc	0.985	0.502	0.835	2.322
3. Cent.Store	0.127	-	-	0.127
4. Procr. Cell	0.069	-	-	0.069
5. Farm Oper.	0.890	0.798	-	1.688
6. Transport	0.465	0.914	-	1.379
7. Auto W'shop	0.620	0.121	-	0.741
8. Works, Rep, Maint.	0.188	0.969	-	1.157
9. Lab. Equip., Maint.	0.204	0.036	-	0.240
10. Space Alloc. (A Committee)				
11. Germplasm				
-PIC	0.715	0.135	-	0.850
-PGR	0.190	0.079	-	0.269
12. Nat. Herb.	0.478	0.122	-	0.600
13. Trng. Inst.	0.496	0.083	-	0.579
Total:	6.238	4.338	0.970	11.546

*Adjusted to exclude housing rental.

Probably less attention has been given, in general, to the relationship of establishment and operational budgets of support services than to research projects/programs. None-the-less, it is understood that operational budgets in the support units are inadequate and thus administration is faced with the need to determine priorities and allocate resources both among and within the units. It is suggested that these decisions can be assisted by an approach similar to that suggested to determine research priorities and resource allocation to research programs and projects within them.

In essence, it is recommended that for each support unit a proposal be developed to cover the first stage implementation of the plan. The proposals should at least include the following:

- Name of the unit
- Mandate: a clear, concise statement of its role as a support service to research.
- Current status: a brief description of the program, staff and facilities.
- Critical area to develop/strengthen to meet needs of first stage implementation of the Research Master Plan and assign priorities.

- Input Requirements: quantify and assign priorities.
- Budget

At first it was envisaged that these proposals might be submitted during the course of this consultancy but it proved to be overly-ambitious. However, most of the support units identified the prioritized constraints and needs for the next three years. The information is summarized in Annexure VII and provides a good basis for review, confirmation of priority needs, and budgetery allocations.

As with research projects, support units should submit periodic reports (progress and workplans), enabling the NARC administration to more objectively monitor performance (inputs and outputs). The reports should be based on the proposals.

5.4 Administrative Actions

The following actions are indicated to support priority projects during the First Stage implementation of the NARC Research Master Plan:

- Allocate non-development operational funds, and flexible development funds to favor highest priority projects.

- Use information from support service units to further refine priority needs and allocate resources.

- Seek additional support from the Government of Pakistan and other donors based on solid evidence that NARC is objectively identifying projects of higher priority for implementation during the first stage of the Master Plan, and is allocating resources accordingly.

6. MONITORING AND EVALUATION

6.1 The Problem

There appears to be agreement about the need to strengthen the office at NARC charged with the responsibility for monitoring and evaluation (PRMC Unit). On the other hand, there appears to be little justification to strengthen the Unit at this time unless there is a commitment by NARC to improve procedures for project formulation, determine project priorities, allocate support in accordance with priorities, and systematically report progress and workplans.

The purpose of this section is to a) relate project-level planning, review, approval, and reporting to monitoring and evaluation and b) suggest measures to strengthen the PRMC Cell at NARC.

Information is the most important input for decision making. The processes of monitoring and evaluation are the primary means of collection and analyzing information, and are thus intrinsic to good research management (Monitoring and Evaluation in the Management of Agricultural Research, Diana Mclean, Working Paper No.14, ISNAR, May 1988).

Recalling the previous sections of this report, the relevance and priority of project-level research can only be determined if its objectives are clearly stated and relate to greater research objectives (e.g., at the program/institute, center and PARC levels). Once objectives have been clearly defined, verifiable progress indicators must be selected and methods of measurements determined. These, then, provide the basis for monitoring which builds up the body of information for subsequent evaluation.

The following figure is useful to visualize the role of monitoring and evaluation, and the relationship between them.

Monitoring tracks research performance, and includes the periodic recording, analysis, reporting and storage of data on key research indicators both for inputs and outputs. It will be recalled that information on progress indicators is called for in the suggested formats for project proposals, and in both periodic progress reports and work plans. The information obtained through monitoring is used to determine if a project is proceeding according to plan, and to take any corrective action required during the course of project implementation.

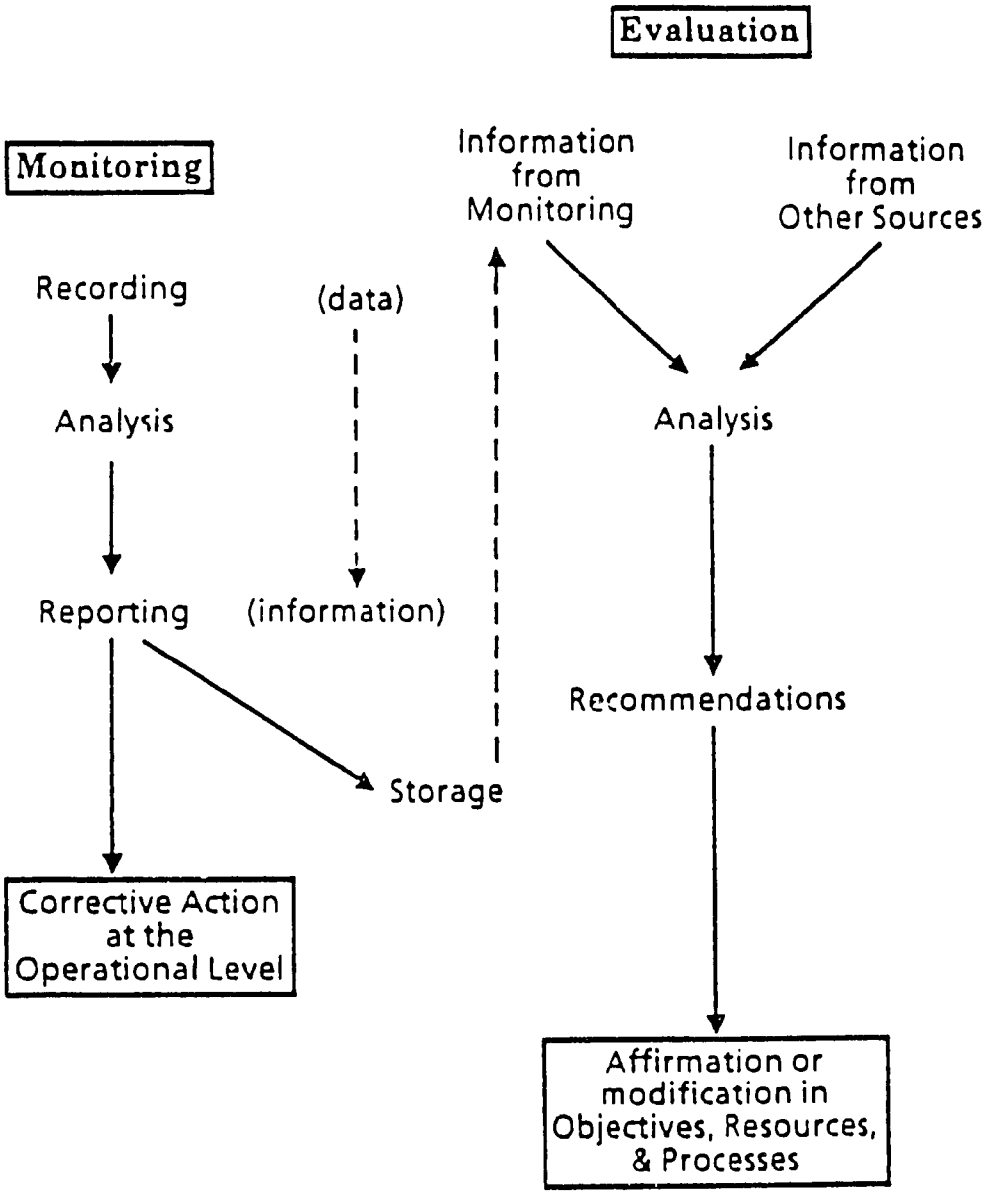
Evaluation of projects is based on information gathered through monitoring and from other sources.

6.2 Planning Research Monitoring and Coordination Unit (PRMC)

The PRMC, headed by a deputy director, reports to the director general. Its role, as stated in the Master Plan, is to help implement the decisions of the Research Committee and to monitor in order that progress is smooth and that scientific efforts are not blocked (p. 192). The importance of project performance indicators is recognized. However, the list of nine programs and project indicators in the Plan seems to confuse indicators with mandates, goals, objectives, etc.

The Cell started functioning in April 1987 with the appointment of a full-time Deputy Director assisted by two scientific officers. It is involved in the planning, monitoring and coordination of research at NARC. Although not stated explicitly, it is assumed that it is also responsible for providing material and making administrative arrangements for project evaluations.

Figure 1: Relationship of Monitoring to Evaluation



Source: Monitoring and Evaluation in the Management of Agricultural Research, Diana McKean, Working Paper No. 14, ISNAR, May 1988.

The work related to planning consists largely of development of formats for use in proposal of research experiments/ projects. These formats are approved by the Research Committee prior to being transmitted to the scientists. PRMC has also developed a format for in-house evaluation and review of all completed/ongoing experiments. The monitoring role of the Cell involve periodic preparation of inventories of all programs/projects. These inventories include budget, objectives, achievements and manpower.

PRMC also plays the important coordinating role acting as intermediary between scientists and the review bodies, developing agendas for review meetings, and following up on decisions taken.

In this exercise PRMC will be considered only in the context of its responsibilities for monitoring and evaluation, although its additional responsibilities are recognized.

Perhaps it would be useful to consider the role of the PRMC unit in monitoring and evaluation in relation to a single research project, following it from the proposal stage through completion and ex-post evaluation. This review will be in the context of previous sections regarding project formulation and approval, reporting and project support.

Under the direction of the DG, NARC, the PRMC unit reviews a project proposal to see that it conforms to the standard format -- that the information needed by the review bodies is complete. It arranges meetings of the review bodies, providing them with the proposal and any comments made by the unit, or by others. It prepares the agenda, and follows up on actions taken. It maintains a copy of the approved proposal which is the initial document in the monitoring and evaluation processes. Basically the PRMC serves as a secretariat to the reviewing bodies as well as to the NARC administration.

During the period of project implementation, PRMC monitors progress in provision of planned inputs (requirements such as personnel, equipment, supplies, funds and support services) and outputs (e.g. tissue culture technology for date palm propagation).

This monitoring is based primarily on verifiable progress indicators, called for in project proposals and work plans, and reported on in various progress reports and work-plans. The process comprises 1) the regular recording of key indicators, 2) reporting the information to appropriate levels of management, and 3) a system of storage of information which is readily accessible (Fig. 1)

The information stored by the PRMC unit should be the single most important input to project evaluation.

Perhaps one of the most difficult steps in the overall process is clear specification of progress indicators for project inputs and outputs. The following table may be useful in this regard. It not only shows possible indicators and means of verification at the project level, but also at the program or national/institute levels. It further, indicates responsibility for data collection at the different levels.

Table 5: Examples of Research Program Indicators

Levels of management	Possible indicator	Means of verification	Responsibility for data collection
-Project Inputs - based on operation workplans:			
- personnel	scientific and support time	time sheets	individual report.
- funding	expenditures	accounting data	accounting office
- facilities	construction or acquisition	on-site report procurement data	institute engineer accounting office
- equipment & supplies	acquisition actual use	procurement data lab/station logs	accounting office lab/station mgr
- leadership	project meetings program meetings	meeting reports meeting reports	project head program head
- training	courses completed	training records	training officer
Project Outputs			
- preliminary res. results	research data from experiments	research reports publs. & Surv.	scientist Project head
- completed res. results	program committee recommendations	program records annual report	program head NARS
- research capacity improved	trained personnel & improved facilities	training records administration records	training officer administrator
Program - Contribution of knowledge from research programs to research, development and policy-making bodies:			
- new knowledge of interest to research, extension & policymakers	released technology or recommendations communications	program records certification res/extension NARS on policy	program head national body extension service
National/Institute - Research relationship to national development objectives			
- increased crop production	production data	farm surveys	statistics dept.
- intensified land use	changes in crop patterns & inputs	input statistics	devel. ministry
- conservation & land use	reduced erosion resource planning	survey methods planning document	land use body planning body
- increased income	per capita change increased spending	national data village surveys	statistics dept. devel. ministry
- improved nutrition	decreased disease & mortality	nutrition survey	national health service

Source: ISNAR Working Paper No.14. May 1988

The ability of the PRMC Unit to fulfil the role described depends upon:

- Adequate project proposals (containing clearly defined outputs, inputs and verifiable progress indicators);

- Progress reports and work plans geared to the same outputs, inputs and verifiable progress indicators; and

- Adequate staff, equipment, supplies and funds.

The first two factors and suggested action plans are dealt with in previous sections. The latter was commented on by the NARC Master Plan Implementation Executive Body (October 1989). It was concluded that a study tour to Egypt by the head of the unit would be useful to observe the Project Implementation Unit established by the National Agricultural Research Center. Further, the Master Plan contains the recommendations of the NARC Review Team Report stating "a planning and monitoring cell should be created and attached to the DG to service the Board of Management. This cell headed by a Director, would function in a staff role to the DG and Board of Management". Thus, according to the Review Team, the current PRMC is inadequately staffed.

It also seems clear that a microcomputer and appropriate software will be required for the unit to cope with the envisaged volume of information involved, to be retrieved on short notice in the form required.

6.3 Administrative Actions

If administrative actions recommended in the preceding sections of this report are taken, then there is a need to strengthen the PRMC. Specially,

- The PRMC should be headed by a senior person with good research experience, commanding the respect of NARC scientists;

- training is needed in the role and operation of an agricultural research monitoring and evaluation unit; and

- operations need to be computerized which will require provision of a computer and appropriate software.

7. DELEGATION OF ADMINISTRATIVE AND FINANCIAL AUTHORITY

The Problem

It seems unclear at this time just what role the Director General of NARC is expected to play. The consultant has been proceeding on the assumption that the DG is responsible for development and implementation of the research program under the NARC mandate. As such, he looks to PARC for policy guidance for research priorities, but he alone would need to be responsible for NARC's program. If this is not intended, serious questions are raised about the role of NARC and how it could ever be expected to objectively identify high priority projects and carry them out on an inter-disciplinary basis. Unless NARC is intended to handle its own program, it would seem that much unnecessary expenditure has been made is setting up an impressive infrastructure.

If this impression is true, PARC neads to unequivocally spell out the role of the center, and of its director general. Unless a strong director general is soon named, placed in position, and given full authority and support to carry out NARC's mandate, there is little hope that the envisaged first-stage Plan implementation can be realized.

A second problem relates to the delegation of financial authority. Most research administration project and program leaders would like to be fully in control of resources allocated to their research - to have and administer the allocated funds as and when needed. In practice, however, this often proves to be unworkable because of problems associated with accountability of public funds. This, then is a common problem of deciding to what extent financial authority should be delegated. It seems clear that problems exist at NARC on the timely availability of funds earmarked for specific projects. This may or may not call for further delegation of authority to lower levels. It could reflect laxity in exercise of already delegated authority. In any case, it calls for attention.

7.2 Approaches to Improvements

This consultant does not pretend to have ready answers to the above problems, but he is aware that serious consideration has been given to them. Attention is called to the Internal Management Review of NARC under the auspices of the PARC Directorate of Planning. Clearly it contains useful recommendations and could be used as a point of departure by both PARC and NARC.

Without serious question, implementation of the first phase of the Plan depends first and foremost on having a strong director general at NARC with full authority, and support by PARC, to carry out the mandate of that centre. This is the first priority action and should be expedited. Presumably PARC has well-defined

procedures to accomplish this action which probably include a selection committee. Assuming this to be the case, such commitee should be constituted promptly with an early deadline to submit nominees for further review and decision by the chairman.

It is unrealistic to expect the director general to have direct responsibility for overseeing the many administrative and support services at NARC. There is ample justification for a deputy director general to whom such responsibilities would be delegated.

A careful look should be given to further delegation of authority at NARC down to the functional levels. It should be approached on the basis of expecting such delegation of authority to be associated with an expected commensurate level of accountability.

7.3 Administrative Actions

The following actions are recommended to be taken as prerequisites to successful implementation of first-stage of the plan;

- Placement of a strong director general at NARC with full responsibilities to carry out the mandate of the centre and full support by PARC.

- Placement of a deputy director general of NARC to be responsible for the administrative and support service units.

- Further delegation of financial authority to functional levels, with commensurate accountability.

8. TRAINING TO IMPROVE PERFORMANCE

8.1 The Focus

At the outset it is emphasized that the consideration here is training for NARC staff (research managers, researchers and support services units personnel) as related to implementation of the first stage of the Master Plan. There is no pretension of dealing with the overall role of NARC in training, nor of the longer term training needs for its staff. For this broader treatment, a national research network manpower inventory is needed as a basis of analyzing the present and projected staffing and training needs. Further, it is recognized that useful reviews have been made of training needs and measures to meet them (e.g. the 1988 internal management review report - NARC, and the consultancy report of Dr. F.C. Byrnes, September 1988.)

8.2 First-Stage Implementation Needs

Training that is to have an impact on implementation of the first stage of the Master Plan must be completed within the next year or so. Thus, two types of training are involved: 1) advanced-degree where the individuals are already in training and are expected to join NARC in the near future, and 2) short-term. The latter is the actionable component; the part that can be managed to provide the right kind of training at the proper time.

How can the short-term training needs be identified? Based on the earlier sections of this report, training needs will be identified by the scientists through formulation of project proposals. A number of support service units have identified training as a high priority need. Further, the Master Plan itself gives some idea of the nature of training that may be required. The projected manpower needs for the period 1988-2000 are given in summary form in Chapter 7. The number of lead scientists (each with in associated group of PSO, SSO and SO) are give by projects, program and institute. The plan envisions an increase of lead scientists from 268 in 1988 to 420 in the year 2000. Corresponding figures are given for the first stage of the plan period.

8.3 The Training Institute

The Training Institute clearly has an important role to play particularly in non-degree training. It can serve as a focal point for group training by highly qualified national and expatriate professionals, thereby reducing the relatively costly procedure of sending nationals outside of the country for the same training. In developing terms of reference for consultants to NARC and PARC, consideration should be given to their possible role in training, making use of the Training Institute when feasible to instruct appropriate personnel in NARC, as well as in other components of the national agricultural system.

The institute is not the only or best plan for all of the needed short-term training. Some should be done in other parts of the country and abroad as appropriate. For example, the international agricultural research centers offer a wide range of short-term training. The details of their training are made known well in advance, giving institutions like NARC ample time to register participants. Finally, it is noted that Dr. John Woods, a consultant under the MART project, is looking at the role of the institute vis a vis the needs of NARC.

8.4 Administrative Actions

Coincident with prioritizing projects, develop a short-term training program to meet the needs of the participating scientists

and of the personnel of the support service units. The primary responsibility for this task should rest with the Training Institute as it will have a major role in carrying out the training.

9. FINANCIAL IMPLICATIONS

A number of administrative actions have been recommended. It is reasonable to be concerned about the financial implications involved. In order to address this issue, consideration will first be given to measures to strengthen procedures for project formulation, prioritization, reporting, and monitoring and evaluation. Then, attention will be directed to project implementation as affected by recommendations in this report.

9.1 Processes

This report contains recommendations designed to improve the performance of NARC in:

- formulation of project proposals;
- prioritization of proposed projects for implementation during the first stage of the NARC Master plan;
- preparation and utilization of project reports; and
- monitoring and evaluation of projects

Implementation of actions called for under these recommendations has relatively minor financial implications. They are primarily concerned about how things are done, rather than calling for additional things (staff, facilities, operational budget, etc). There is an exception in the process of monitoring and evaluation. The PRMC needs to be strengthened, but the cost is modest.

9.1 Project Implementation

The financial implications of the research program of NARC covering the first phase implementation of the Master Plan cannot be determined at this point. First, NARC must decide on a prioritization of projects with associated budgets. This report contains recommendations as to how prioritization and allocation of funds should be made. The next step is for the scientists, review groups and the administration to go through the processes required to arrive at a high priority, justifiable research program in the period 1990/91-1992/93.

It is stressed that adherence to the aforementioned processes, or modifications of them, is fundamental, regardless of the financial resources available or desired. A rational, objective

prioritization of research enables a corresponding allocation of financial resources, whatever they may be. Further, this approach greatly enhances the probability of obtaining results to investment in research. The implications of this are apparent as related to prospects for greater government and other donor support needed to expand the research program of NARC.

There may be an indirect financial implication associated with project implementation and output utilization as envisaged in this report. In the format for project formulation, the scientists and NARC are expected to be concerned with utilization of the planned outputs (e.g. a urea/molasses block to be used as a feed supplement, or a procedure for propagation of an improved plant through tissue culture). In some areas initial support may be needed to assist user entities (e.g. private sector) to embark on a program to utilize the research output for its intended purpose. Such needs cannot be quantified at this time, but starting with the prioritization of projects, a much better picture will emerge of prospective opportunities for utilization of products of research during the next 1-3 or 3-5 years.

9.3 Support Services

There appears to be no question about the need to strengthen most, if not all, of NARC's support service units. As described in a preceding section (Project Support), constraints and needs have been identified which are useful in determining realistic budgets.

Annexure-I

TERMS OF REFERENCE

NARC Master Plan Implementation Consultant

Assist DG/NARC and his appointed committee to:

1. Prescribe procedures for selecting research/projects for first stage implementation within the framework of NARC thrusts with relatively quick and high potential pay-off.

2. Approve selected inter-disciplinary research programs/projects consistent with NARC Master Plan enunciated priorities.

3. Recommend staff, budget and support service allocation on a project basis deemed necessary to conduct approved research.

4. Refine formats for project formulation with multi-disciplinary approach and progress reports (half-yearly and final), which permit objective evaluation of performance, mandatory publication of research findings and transfer of technology.

5. Define support service and management indicators against which performance can be measured and remedial action taken.

6. Propose precise delegation of financial and administrative authority at various levels.

7. Strengthen the PRMC with a capability and facility to effectively monitor Master Plan implementation.

8. Prescribe procedures for the objective measurement of performance of research, support and management staff to recognize merit by grant of accelerated promotion, financial and other awards and letters of commendation.

9. Articulate training needs to improve research, management and or support service performance.

10. Perform other tasks which Chairman, PARC, may like to assign to the consultant, regarding implementation of NARC Research Master Plan.

Annexure II

Persons met or interviewed by the Consultant

A. **PARC**

Dr. C. M. Anwar Khan
Secretary ARD, and
Chairman

Sahibzada Muhammad Ayyaz
Member (Finance)

M. Hanif Qazi
Member (CS and NR)

Dr. M. Akmal Khan
Member (AS)

Dr. Ali A. Hashmi
PSO (PP)

Mr. Manzoor Ali Chaudhry
Director (AE)

B. **NARC**

Dr. M. Yousaf Chaudhri	Director General
Dr. M. Akmal Khan	Deputy Director General (Research)
Mr. Zahoor Ahmad Malik	Director (Administration)
Dr. M. Aslam	Director (CDRI)
Dr. A. H. Cheema	Director (ASI)
Dr. M. Ashraf	Technical Director, FMI
Dr. Shahid Ahmad	PSO (Water Resources)
Dr. Rakhshan Roohi	Resources Use
Mr. Bashir Ahmad Malik	Coordinator (Pulses)
Dr. Azra Quraishi	PSO (Tissue Culture)
Dr. Rafique Ahmad	CNO (NR)
Dr. N. I. Hashmi	Coordinator (Wheat)
Dr. M. Ashraf	Coordinator (Vegetables)
Dr. M. Banaras Raja	Vegetables
Mr. Hasham Laghari	Coordinator (Fruit)
Mr. Karim Balkh Malik	Sugar Crops
Mr. Rashid Anwar	PSO (PGR)
Dr. Yasin J. Nasir	P.I. (Herbarium)
Dr. M. Aslam	Coordinator (Maize)
Dr. M. Salim	Coordinator (Rice)
Mr. A. Shakoor	Coordinator (Sorghum & Millet)
Dr. M. Afzal	PSO (Animal Health), ASI
Dr. Amanat Ali	PSO (Animal Nutrition, ASI)
Dr. C. M. Ozair	SSO (Weed Science)

Dr. Muzaffar A. Khan	SSO (Biol. N-Fixation)
Dr. Zaib Abdullah	SSO (Stress Physiology)
Mr. Manzoor Ali Chaudhury	Social Sciences
Mr. Abdul Qayyum	Deputy Director (PRMC)
Mr. Abdul Ahad	Director (FO&S)
Mr. Javed Ahmad	Deputy Director (Finance)
Mr. M. Idrees	Store Officer
Mr. Hamid Pervaiz	Procurement Officer
Mr. Nawaz Ali Shah	Manager (Auto Workshop)
Mr. Mushtaq Ahmad	Transport Officer
Ch. Nazir Ahmad	Deputy Director (Landscaping)
Mr. Aftab Ikram	XEN
Haji Fazal Hussain	Security Officer
Mr. Shafiq Ahmad	Senior Reprographic Officer, SIU
Mr. Ghani Haider	Deputy Director (Library)

C. **USAID/Pakistan**

Mr. Harry Dickherber	Deputy Agricultural Development Officer
Mr. Curtis Nissley	Project Manager - MART

D. **MART/Winrock**

Dr. Bill C. Wright	Chief of Party
Dr. Murray Dawson	Advisor, Farming Systems Research
Dr. Cordell Hatch	Advisor, Information Transfer

Annexure-III

RESEARCH PROGRAMS AND PROJECTS AS PRIORITIZED BY INSTITUTES IN THE NARC MASTER PLAN

Program Title	Numbers Priority of Projects 1st	2nd	3rd	4th	Sub-Total
CROP PRODUCTION					
Wheat, Barley, Triticale	7	4	3		14
Maize	3	2	1		6
Rice	3	3	1		7
Sorghum and Millet	7	3			10
Fodder Crops	6	2	2		10
Pulses	2	2	1	2	7
Oilseeds	8				8
Sugar Crops	2				2
Vegetable Crops	4	11	2		17
Fruit Crops	4	3	4	1	12
Seed Science & Technology	5	4			9
Plant Genetic Resources	5	3			8
Plant Introduction Center	4	3			7
Tissue Culture	6	3			9
Cytogenetics	2	3			5
Food Technology	4	4	2		10
	72	50	16	3	141
PLANT PROTECTION					
Crop Diseases Res. Instt.	11	7			18
Plant Virology	6	4			10
Entomology	4	3	2	2	11
xxxxxxxxxxxxxxxxxxx			1	2	3
Vertebrate Pest Management	4	4	1	5	14
	25	18	4	9	56

ANIMAL SCIENCES

Animal Breeding & Genetics	3	2	1	6
Reproductive Physiology	2	2	2	6
Embryo Transfer	2	1	1	4
Meat Production	3	1	1	5
Dairy Technology	2	2		4
Poultry	3	1		4
Animal Nutrition	4	6	4	14
Animal Health	7	4	2	13
Sheep and Wool	4	2		6
Goat Production	3	2		5
Fisheries	4	2	2	8
	37	25	13	75

NATURAL RESOURCES - SOIL SCIENCES

Soil Fertility and Plant Nutrition	5	2		7
Soil Chemistry & Mineralogy	4			4
Soil Biology	3	3	1	7
Soil Physics	4			4
Stress Physiology	7			7
	23	5	1	29

NATURAL RESOURCES - WATER RESOURCES

Soil & Water Conservation	3	2		5
Irrg. System and Mgt.	3	2		5
Agro-Meteorology	3	3		6
Ecology	1	1		2
Remote Sensing	1	2	1	4
Agro-Forestry	8	2		10
Forage and Pasture	5	2	2	9
Agriculture	3	3	3	9
Sericulture	4	4	2	10
	31	21	8	60

OTHER PROJECTS

A.E.R.U.	13	11	2	26
Computer & Statistical Service	5	3		8
Agricultural Machinery	7			7
Farming Systems Research	4	3	3	10
Library Services and Documentation	7	1		8
	36	18	5	59

Annexure IV

A Checklist of Priorities Among NARC Research Projects and a Listing of Proposed Projects For Master Plan Implementation (First Stage)

Programme/Project	Fit to NARC: Agro-Ecol	Fit to NARC: Mand-ate	Potential Impact	Work at Other Centres: Pakistan	Work at Other Centres: Abroad	Prob. Output Attainment: 1-3 yr.	Prob. Output Attainment: 3-5 yr.	Interdisc. Nature	Staff Avail.	Cost Estimate (Rs.mill.)	Weighted Priority 1-5 1=Low;5=high
	(H=High, L=low, M=Medium)										
1. CROP PRODUCTION											
1.1 Wheat, Barley, Triticale											
1.1.1 Development, introd;, eval. and dist. of germplasm											
1.1.2 Multilocation testing & eval. (NUWYT)											
1.1.3 Dev. HYV with disease, stress res. for rainfed, problem soils											
1.1.4 Imp. cult. practices barani/on-farm work											
1.1.5 Computer simul. models as tool for mgt. res.											
1.1.6 Diver. genet. base of rust resist. in commer. var.											
1.1.7 Cell-level screening for disease resist.											
1.2 Rice											

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1.2.1 Genet. studies on insect resistance

1.2.2 Evaluation and distribution of germplasm

1.2.3 Basmati imp./ innovative means

1.2.4 Direct seeding technology

1.2.5 Screening to biotic stress

1.2.6 Environ. stress/ insect resist.

1.2.7 Physiochem char. and mgt. of soils

1.2.8 Grain quality

1.3 Maize

1.3.1 Varietal resist to C. partellus

1.3.2 Drought and cold toler. using genetic, chem. and physical. diversity in field and lab.

1.3.3 Heterochromatic knob comp. in predicting comb. abil. and toler. in breeding depression.

1.3.4 Modelling input levels for econ. cult. under barani thru. FSR

1.4 Sorghum & millet

1.4.1 Coll/eval/conser

1.4.2 Dev. HYV sorg.

1.4.3 Dev. sorgh. hybrids

1.4.4 Obser. nurseries & rep. trials

1.4.5 Sorgh. var./ stay green char.

1.4.6 Improv. prod. tech. via FSR

1.4.7 Sorgh. agron.

1.4.8 Millet germ, in obser. nur./rep. trials

1.4.9 Major sorgh dis/pest & dev. of resistance

1.4.10 Sorgh. germ. toler. to stress

1.4.11 Collect, eval, conser. millet germplasm

1.4.12 Devel. pearl mill. hybrids

1.4.13 Millet dis/pests & dev.of resistance

1.4.14 Millet agronomy

1.4.15 On-Farm & FSR trials

1.5 Fodder Crops

1.5.1 Coll./screen./eval./ maint. germplasm

1.5.2 Mech. fodder prod.

1.5.3 Equipment for tillage operations

1.5.4 Economic anal. of tech. package

1.5.5 Eval. cereal and legume fodders

1.5.6 Evaluation of fodder mixtures

1.5.7 Nutritive value of mixtures

1.5.8 Economic analysis

1.5.9 Areas with defic/ scarcity periods

1.5.10 Eval of fast growing lines

1.5.11 Annual calendar in fodder supply

1.6 Pulses

1.6.1 Eval. chickpea germplasm-rainfed/ rice-based conditions

1.6.2 Screening chickpea Ascochyta blight

1.6.3 Screening lentil germplasm

1.6.4 Coll./eval/class. mash germplasm

1.6.5 Eval. mung bean germplasm

1.6.6 Desi-Kabli introgression in chickpea

1.6.7 Crossing techniques in Vigna spp.

1.6.8 Eval. segregating material of mash

1.6.9 Gene transfer of orange cotyledon

1.6.10 Eval. chickpea segregating material in stress

1.6.11 Eval. segreg. material lentil for disease res.

1.6.12 Eval. mung bean segreg. material

1.6.13 Eval. mash segreg. material

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1.6.14 Varietial trials(8)

1.6.15 Multilocational trials (9)

1.6.16 Devel. improved pigeon pea lines

1.6.17 Eval. of cow-pea germplasm

1.6.18 Eval. of P. Vulgaris for Kaghan and Kalam Valleys

1.7 Oilseeds

1.7.1 Maint./eval. soybean germplasm

1.7.2 Imp. rape/mustard var. with "oo' characters

1.7.3 Nat. uniform soybean yield trials

1.7.4 Screening soybeans to major diseases

1.7.5 Introduction soybean in crop systems

1.7.6 Fertilizer cum inoculum trial

1.8 Sugar Crops

1.8.1 Acquisition document and dist. sugarcane germplasm.

1.8.2 Acquisition, document. and dist. sugarbeet germplasm

1.9 Vegetable Crops

1.9.1 Cost-efficient off-season production.

1.9.2 Onion for better shelf life, etc.

1.9.3 Growth regulators to enhance storage life of onions

1.9.4 Ident. parents for F1-hybrid seed prod. tomatoes.

1.10 Frults Crops

1.10.1 Introd/eval. 5 strawberry cultivars

1.10.2 Eval. of 10 cultivars of grapes

1.10.3 Leaf mineral comp. sweet orange as affect. by rootstocks

1.10.4 Effect of paclobutrazol on prop. of guava

1.11 Seed Sclence and Technology

1.11.1 Seed qual attributes as related to field performance

1.11.2 Seed Invigoration/ stress alleviation thru. seed coating etc.

1.11.3 Factors contributing to weed seed banks

1.11.4 Maintenance/exchange of healthy seeds.

1.11.5 Electrophoretic separ. isoenzymes for access and as genet. marker.

1.12 Plant Genetic Resources

1.12.1 Cryopreservation of veg. prop. crops

1.13 Plant Introduction Centre

1.13.1 Introd. for soil stress conditions

1.13.2 Introd. of medicinal plants

1.13.3 Introd. of spices

1.14 Tissue Culture

1.14.1 Technology for potato

1.14.2 Technology for tomato

1.14.3 Technology for rice

1.14.4 Technology for wheat

1.14.5 Technology for tomato

1.14.6 Technology for date palm

1.15 Cytogenetics

1.15.1 Species introgression in Brassica

1.15.2 Induct. seed steril in tea

1.15.3 Alien genet. trans. in wheat

1.15.4 Cytogen. stud. in Lathyrus

1.16 Food Technology

1.16.1 Screening cereals for nut.eval/ consum. accept.

1.16.2 Screening pulses for nut.qual/ consum. accept.

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1.16.3 Screening oilseeds for nut. qual/ consum. accept.

1.16.4 Effect environ on nut. qual/antinut factors of legumes

1.16.5 Effect of storage on nut.qual/consum. accept. of legumes

1.16.6 " " (Fruits)

1.16.7 " " (Vegetables)

1.16.8 Bread with less wheat

1.17 Applied Microbiology

1.17.1 N-Fixation

1.17.2 P-mobilizing organisms

1.18 Stress Physiology

1.18.1 Environ. stresses/ reproduct. physiol

1.18.2 Non-conventional salt-tolerant plants

2. PLANT PROTECTION

2.1 Pathology

2.1.1 Isolates of B. thur for broad spectrum control

2.1.2 Trichoderma her for root rot

2.1.3 Web blight-rice

2.1.4 Damping off-Brassica napis

2.2 Virology

2.2.1 Cross protection tomatoes

2.2.2 Cross protection potatoes

2.3 Entomology

2.3.1 IPC-Yell rice stem borer

2.3.2 IPC-Rice leaf folder

2.3.3 IPC-Sugarcane top borer

2.3.4 IPC-Sugarcane stem borer

2.3.5 IPC-Cabbage butterfly

2.3.6 IPC-Economics of

2.3.7 Ident. keys lepid. larvae

2.3.8 Termite control

2.3.9 Insecticides of plant origen

2.4 Weed Sciences

2.4.1 Weed control tech/ sel. crops

2.4.2 Critical period in weed-crop competition

2.4.3 Application technology

2.5 Vertebrate Pest Management

2.5.1 Rat control

3. ANIMAL SCIENCES

3.1 Animal Breeding/Gen

3.1.1 Synthesis dairy breeds diff. ecology zones

3.1.2 Progeny testing buffalo

3.1.3 Progeny testing cattle

3.2 Reproductive Physiol.

3.2.1 Factors affect. post-partum reprod. in bufalloes

3.2.2 Diagnos. early preg. and oestrus in bufalloes

3.3 Embryo Transfer

3.3.1 Super ovulatory and endocrine responses in cattle and bufalloes with PMSG and FSH

3.3.2 Factors affecting superovulation and embryo recovery in bufalloes

3.3.3 Cryopreservation of embryos

3.4 Meat Production

3.4.1 Meat prod./process technology

3.5 Dairy Technology

3.5.1 Milk preservation and milk products at farm level

3.5.2 Microbiol. aspects of dairy products re public health.

3.6 Poultry

3.6.1 Performance testing layers/broilers

3.7 Animal Nutrition

3.7.1 Feeds based on crop residues/agro-industrial by-products (UMB)

3.7.2 Commercialization of feed lot systems.

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3.7.3 Feeding schedules for calf rearing

3.7.4 Biotechnology of silage preparation

3.8 Animal Health

3.8.1 Disease diagnosis/ reference center

3.8.2 Genet. eng. viral vaccines

3.8.3 Antispecies conjugates-livestock

3.8.4 Antispecies conjugates-poultry

3.9 Sheep and Wool

3.9.1 Synth. breeds sheep

3.10 Goat Production

3.10.1 Synth. breeds goats

3.11 Fisheries

3.11.1 Species for commer. farming

3.12 Management

3.12.1 Package of farm mgt(housing, equip, etc)

4. NATURAL RESOURCES

4.1 Soil Science

4.1.1 Site specific fert. recommendations.

4.1.2 Fert. appln. by soil incorp./ incubation.

4.1.3 Zones of micronutr. defic. as guideline to crop root zone application

4.1.4 Efficient application of micronutrients

4.1.5 Agri./indust./ muncipal wastes/ for crop prod. and reducing environment pollution

4.2 Soil Biology

4.2.1 Bio-fert. tech. package with selective strains and transfer media

4.2.2 Effective rhizobium isolates for N-fixation

4.2.3 P-mobilizing free living non-microrhizae

4.3 Plant Physiology

4.3.1 Fibre plants (*Juncus acuatus* and *J. rigidus*, etc.) on the marginal lands

4.3.2 High protein grain or foliage plants for poultry and cattle feeds

4.4 Water Resources Management

4.4.1 Integrated land and water use for barani area

4.4.2 High efficiency irrigation systems

4.5 Ecology, Range Management and Forestry

4.5.1 Technology for ecological land use per land capability

4.5.2 Distribute grass (buffel, vetch, elephant) for arid range lands

4.5.3 Technology for multiplication of tree shrubs for eroded pothowar area

4.6 Apiculutre

4.6.1 Test comb foundation press with private sector

4.6.2 Develop improved management technology of *Apis cerena* and *Apis mellifera*

4.7 Sericulture

4.7.1 Pure lines of silkworm for prod. of hybrid seed

4.7.2 Technology for rural industry

5. AGRICULTURAL MACHINERY

5.1 Harvesting

5.1.1 Harvester for cer./ oilseed crops

5.2 Seeding/Planting

5.2.1 Planter for oil-seed, veg. and sugarcane

5.3 Weeding

5.3.1 Rotary weeder

5.4 Post-Harvest

5.4.1 Seed cleaners

5.4.2 Seed dryers

5.4.3 Pre-coolers for fruit/veg.

5.4.4 Bulk trolley

5.5 Livestock

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5.5.1 Milking equip.

5.5.2 Cleaners

5.5.3 Feeding forks

5.5.4 Forage harvester

5.5.5 Milk chiller

5.6 Meas./Control

5.6.1 Transducers-applications

6. SOCIAL SCIENCES

6.1 Agricultural Economics

6.1.1 Compar. econ. of crops/livestock enerprises with FSR perspective

6.1.2 Commodity research priorities for FSR

6.1.3 Farm productivity, resource avail. and constraints.

6.1.4 Risk mangement

6.1.5 Soil conser. and moisture mgt.

6.1.6 Profit. anal. and dom. resource cost.

6.1.7 Return to investment in agr. res.

6.2 Computer & Statistics

6.2.1 Standard field plot techniques

6.2.2 Standard weed sampling techniques

7. OTHER

7.1 Farming System

7.1.1 Testing with Fateh Jung Project farm families - improved systems interventions

7.1.2 Long-term studies on major barani cropping system - NARC

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Annexure V

NARC: Master Plan Implementation
Suggested Format for Project Proposals

1. Title

The title should be short and concise, reflecting the principal objective of the proposed research.

2. Objective(s)

The objectives should be sharply-focussed, lending themselves to measurement of progress during the course of the project, and quantification at the end of the project.

3. Problem

A clear statement of the problem to be addressed by the proposal. How important is the problem?

4. Previous and Present Work

Make clear what has been and is being done about the problem, both inside and outside of Pakistan. From this review it should follow what additional information or technology is required.

5. Methodology/Approach

Describe how the additional information or technolgoy will be achieved or realized.

6. Specific Outputs (Products) Anticipated

These flow from the objectives. State specific expected outputs for each objective. Specify in terms of information, technology, publications, etc. expected within a) 1-2 years and b) 3-5 years. List progress indicators for each output.

7. Utilization of Outputs

Provide particulars of intended users of outputs, and what will be done to encourage utilization. Specify whether users are in public or private sector.

8. Collaboration

Mention specific intended collaborators and nature of collaboration: a) within NARC, b) with other PARC

institutions c) with other institutions within Pakistan, and d) with institutions outside of the country. Specify any private sector collaboration.

9. Inputs Requirements

Include, and quantify to extent possible: staff, training, facilities, material, land, transportation, etc. Specify the support services involved, and when services are needed. List principal progress indicators (steps toward provision of principal inputs.)

10. Budget

Provide budget by year showing detailed estimated staff, operational and capital costs.

NARC 1989-90 Non-Development and Development Budgets (Rs '000')

Programmes	Non-Development Estab.	Operat.	Capital	Total-I	Development Estab.	Operat.	Capital	Total-II	Grand Tot
CROP PRODUCTION									
Wheat, Barley & Triticale	1290	430	8	1728					1728
Rice	1306	282		1588					1588
Maize	816	370	7	1193					1193
Sorghum & Millet	356	172	2	530					530
Fodder Crops	498	153	4	655					655
Pulsues (chickpea)	1166	230		1396	91	619	540	1250	2646
Oilseeds	867	501	7	1375	289	230	2	521	1896
Sugar Crops	258	62	2	322					322
Vegetable crops	371	280	17	668					668
Fruit crops	340	224	4	568					568
PGR	190	79	2	271	768	135	15	918	1189
PIC	715	135	6	856					856
Tissue Culture	560	201	22	783					783
Cytogenetic	6	69		75					75
Food Technology	717	184		901					901
PSI Directorate	23	5		28					28
Sub Total-I	9479	3377	81	12937	1148	984	557	2689	15626
PLANT PROTECTION									
CDRI	1983	390	6	2379	102	50		152	2531
Entomology	484	120	2	606					606
Plant Virology	419	288	12	719					719
Weed Science					416	205	150	771	771
Sub Total-II	2886	798	20	3704	518	255	150	923	4627
ANIMAL SCIENCE									
Animal Sciences Institute	3666	1607	95	5368					5368
Poultry	183	211	38	432	543	200		743	1175
Dairy Cattle	49	30		79					79
Livestock (Sheep & Wool)	390	105	2	497	293	584	1449	2326	2823
Fisheries	319	102	52	473					473
Catla Catla	72	68	70	210					210
Sub Total-III	4679	2123	257	7059	836	784	1449	3069	10128

NATURAL RESOURCES									
Soil Sciences	1237	784	11	2032					2032
Water Resources	553	451	38	1041					1041
Ecology	133	56		189					189
Remote Sensing	183	71		254					254
Agro-Forestry	54	77	68	199					199
Forage and Pasture	585	114		699					699
Honeybee	828	81		909	36	223	340	599	1508
Sericulture	63	42	16	121					121
Sub Total-IV	3636	1676	133	5445	36	223	340	599	6043
OTHER PROGRAMS									
AGS	4720	7770	48	12530					
Computer and Statistics	258	256	7	516					
PRMC	199	50		249					
Agriculture Extension	623	161		784					
Training Institute	409	170		579					
Farm Operations and Services	890	798		1688					
Automobile Workshop	620	121		741					
SIU	985	502	835	2322					
Agricultural Machinery (FMI)	2550	655	67	3272					
BARD					2904	1770	4012	8686	8686
MART (Training)					546	729		1275	1275
MART (AVC)					811	570	135	1516	1516
Nat. AGRIS					180	271	60	511	511
CMP					2653	2195	35	4883	4883
Italian Fruit and Veg. Program					913	1156	236	2305	2305
Plant Sciences (World Bank)					3500	800		4300	4300
Lab. Equipment					204	36		240	240
AERU					431	166	10	607	607
National Herbarium					478	122		600	600
Sub Total-V	11254	10483	957	22681	12620	7815	4488	24923	24923
GRAND TOTAL	31934	18457	1448	51826	15158	10061	6984	32203	61347

Annexure VII

PRIORITIZED SUPPORT SERVICES CONSTRAINTS AND REQUIREMENTS
FIRST-STAGE IMPLEMENTATION - NARC MASTER PLAN

S.No.	Unit	Constraints	Requirements	Budgetary requirements 1990-91 (Millions)
1.	FO&S	1. Inadequate physical facilities	1. Tractors(5)	1.050
			2. Farm implements	0.200
			3. Installation of new tubewell	0.700
			4. Vehicle	0.150
		2. Watch & Ward/Security	1. Boundary fencing	0.350
			2. Wire crate spurs	0.400
			3. Posts for Security Guards	0.250
		3. Lack of trained manpower	1. Vacant posts filled	-
		4. Poor drainage system	1. Drainage system improvement	0.150
			Total:	3.250
2.	Operation and maintenance Unit	1. Inadequate funds for maintaining about 5,00,000 sft. covered area (buildings only)	1. Separate budget	1.000
		2. Poor office/stores accommodation	1. 2350 sft. space	-
			Total:	1.000
3.	Security Section	1. Shortage of security staff	1. Two security supervisors and security guards	-

		2. Un-satisfactory fencing of NARC	1. Covered under FO&S	-
		3. Lack of good quality fire fighting equipments	1. Good quality fire fighting equipments	0.020
		4. Lack of telephone facility at gate No.2/ wireless sets	1. Intercom telephone at gate No.2 5 wireless sets	0.025
		5. Nonavailability of vehicle	1. One Suzuki Jeep and two more motorcycles	0.200
		6. Inadequate huts for Security Guards	1. Covered under FO&S	
			Total:	0.245
4.	Procurement Cell	1. Lack of staff	1. Two L.D.C	-
		2. Nonavailiability of computer facilities	1. A computer	0.045
		3. Lack of photocopying facility	1. Photocopying machine	0.110
		4. Nonavailability of independent vehicle	1. A suitable vehicle	0.150
		5. No revolving funds	1. Sufficient revolving funds	0.015
			Total:	0.320
5.	Central Stores	1. Lack of computer facility	1. Computer with accessories	0.150

		2. Lack of photocopying facility	1. Photocopying machine	0.120
		3. Training	1. Short term training	-
		4. Nonavailability of vehicle	1. Independent vehicle	0.250
		5. Insufficient store space	1. One more store	
		6. Nonavailability of fork lift	1. A fork lifter	0.600
			Total:	1.120
6.	Automobile Workshop	1. Lack of vital tools and equipment	1. Procurement of vital tools and equipment	0.300
		2. Poor working facilities	1. Comprehensive service station with related staff	0.200
		3. Lack of skilled and technical staff		
		4. Inadequate space for staff and storage	1. Shelter roofing of fuel station	0.060
			2. Posts for watch & ward	0.015
			3. Toilets for staff	0.050
			4. Storage of spare parts etc. (racks, almiras)	0.050
		5. Insufficient funds	1. Adequate funds	
			Total:	0.675
7.	Finance and Accounts Section	1. Inadequate staff	1. One stenotypist	-
			2. Recruitment/upgradation staff	-

		2. Lack of computer facility	1. One computer	0.050
		3. Training of staff	1. Local training	0.050
			Total:	0.100
8.	National Herbarium	1. Lack of technical manpower	1. Trained manpower	-
		2. Lack of relevant literature	1. Literature	
		3. Lack of familiarity with work abroad	1. Foreign visit	-
		4. Lack of transport facility	1. One Suzuki Van	
		5. Lack of Lab. equipment	1. Two dissecting microscope 2. One light microscope	
			Total operational budget (1990-91)	1.400
9.	Transport Office	1. Lack of transport	1. 4 Isuzu bus	2.800
			2. 2 Toyota Coaster	1.600
			3. 3 Toyota Hiace	1.300
			4. 4 Toyota double cabin pickup	1.300
			5. 2 Toyota single pickup	0.600
			6. 2 Suzuki Jeep	0.400
			7. 2 Suzuki pickup	0.300
			Total:	8.300
10.	LEMR Unit	1. Scarcity of technical manpower	1. T.O. (Electronics) one 2. T.O. (Glass Blowing) one 3. A.T.O (Glass Blowing) one 4. T.O. (Electrical) one 5. A.T.O. (Refrigeration) one	-

		2. Lack of spare parts, components, etc.	1. Purchase of spare parts	0.200
			2. Repair of NARC equipment	0.100
		3. Transport facility	1. Vehicle already procured under this unit may be placed at the disposal of the unit.	
			Total:	0.300
11.	Training Institute	1. Shortage of lower staff	1. Lab Technician 2. Lab Attendant 3. Photocopier operator 4. Duplicating machine operator	
		2. Lack of training	1. Short term training	
		3. Nonavailabity of AV equipment	1. 2 slide projectors	0.080
			2. 2 overhead projectors	0.050
			3. Photocopier machine	0.150
			4. 2 Micro computers	0.200
			5. Movie camera	0.030
			6. TV with 2 VCR	0.060
			Total:	0.570
12.	NARC Library (SIU)	1. Lack of trained manpower	1. Librarian 2. Classifier 3. Cataloguer	
		2. Inadequate subscription for core journals	1. Core journals raised to 500	1.600
		3. Shortage of books & monographs	1. Books and monographs	1.000
		4. Lack of library equipment	1. Microfilm reader and printer	0.400

			2. Computer with accessories	0.300
			3. Other misc. requirement	0.200
			Total:	3.500
13.	Scientific Information Unit (SIU)	1. Lack of staff	1. 2 Senior Scientific Officer 2. 5 Scientific Officer 3. 4 support staff	
		2. Lack of equipment	1. 5 micro computers	0.400
			2. Photocopier	0.120
			3. Juke box with four CD-ROM	0.100
			4. Slide storage cabinet	0.025
			5. Photographic equipment	0.030
			Total:	0.675