A Self-learning Course

Planning and Managing Forestry Research
Volume IV

Module 7
Financing and Budgeting

Module 8
Providing Support Functions
The initial version of this self-learning course was developed by Dr. Allen L. Lundgren, Mr. Scott J. Josiah, Dr. Hans M. Gregersen, and Dr. David N. Bengston at the University of Minnesota, College of Natural Resources, Department of Forest Resources, in collaboration with the International Union of Forestry Research Organizations (IUFRO), Special Programme for Developing Countries (SPDC), and with the advice and assistance of experienced forestry research managers around the world (see the course guide for more detail on the course development).

The course is available from:

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Vienna, Austria

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Planning and Managing Forestry Research
A Self-learning Course

Module 7
Financing and Budgeting

International Union of Forestry Research Organizations
Special Programme for Developing Countries
Vienna, Austria
# Module 7 - Financing and Budgeting

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List of study units covered in the module:
- Study Unit 7.1. Financing research programs and organizations
- Study Unit 7.2. Developing and evaluating research proposals
- Study Unit 7.3. Preparing budgets
- Study Unit 7.4. Managing funds
- Study Unit 7.5. Promoting research programs with funding agencies
Some of the most difficult problems facing research managers arise from the need to procure and allocate the resources needed to support the planned program of research. Forestry research is rarely well funded. Often a significant fraction of the manager's time is spent in developing budgets, justifying resource programs and needs to current funding sources, and developing relationships with potential new sources of funding. The success of research programs depend strongly on how well managers carry out this critical responsibility. The best laid plans in the world are of little use if funds are not available to implement the planned activities.

In this module you will find out about potential sources of funding for forestry research programs and research organizations. You will find some helpful suggestions on developing, writing, and evaluating research proposals, essential skills needed by researchers and research managers worldwide. You will learn about ways to prepare and manage budgets to support your planned program of work. Finally, you will learn about the importance of promoting or selling your research programs so as to address the special concerns of funding organizations and attract additional funding. The five study units in this module will help you deal with the problems you will encounter as a manager of forestry research in funding and implementing your research program.
Skill & Knowledge Assessment

Module 7 - Financing and Budgeting

If you would like to find out how much you improve your skills and knowledge by studying this module, we suggest that you complete this exercise before beginning the module. This will establish your current level of skill and knowledge about the topics covered in this module. At the end of the module there is an identical skill and knowledge assessment form which you can complete once you have finished the module. By completing and comparing the before and after assessments, you can determine the extent to which you have improved your skills and knowledge.

Below are listed a number of skill and knowledge statements derived from the objectives of the study units in this module. These are identical to those listed for this module in Study Unit 0.3 - Self-assessment of Training Needs, which you may have completed initially to guide your course of study. Please read each statement carefully and indicate with a checkmark the level that best describes your current skill or knowledge, from 1 to 5, using the following descriptions:

1. I cannot perform this skill, or I have not been exposed to the information.
2. I cannot perform this skill, but have observed the skill or have been exposed to the information.
3. I can perform the skill or express the knowledge with assistance from others.
4. I can perform the skill or express the knowledge without assistance from others.
5. I can perform the skill or express the knowledge well enough to instruct others.

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<thead>
<tr>
<th>Skill or Knowledge Statement</th>
<th>Your Level of Skill or Knowledge</th>
</tr>
</thead>
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<tr>
<td>a) Describe the advantages and disadvantages of long-term core funding and short-term project funding.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>b) Recognize the variety of sources from which research funding is obtained.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>c) Structure and outline funding requests and proposals to address both the requirements of the funder and your own research institution.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>d) Describe a procedure that can be used to evaluate proposed research projects and programs.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>e) Develop appropriate budget formats for research programs, projects, and studies.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>f) Use a matrix approach to cope with dual budget systems.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>g) Recognize potential problems encountered in annual budgeting.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>h) Understand the importance of closely monitoring expenditures in managing accountability in the use of funds.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>i) Recognize the need for and importance of periodically reconciling planned (budgeted) and actual expenditures.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>j) Explain the importance of marketing your research program and capabilities.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>k) Develop a strategy and plan for influencing potential funders of research.</td>
<td>1 2 3 4 5</td>
</tr>
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</table>
Financing Research Programs and Organizations

The implementation of forestry research requires money. Your organization's research funding may come from a variety of sources; some may be associated only with specific projects ("soft" or "project" funds); some may be allocated to maintain the basic operations of your organization ("hard" or "core" funds). Most likely your organization's funding will be composed of some combination of hard and soft money.

It is probably no surprise that much of your time as a manager of research may be spent seeking funds or developing and administering budgets. With this in mind, we designed this unit to help you improve your knowledge of the variety of existing funding sources. We also stress the important roles of long-term and short-term funding as part of your organization's overall funding portfolio. We'll also help you identify potential sources of funding for your own organization. Finally, you'll learn of some problems and pitfalls commonly experienced when research programs are supported with funds from multiple sources.

Financing Research Programs And Organizations

Obtaining adequate funding to support desired research programs is becoming a major problem for forestry research managers in many developing countries. For example, government appropriations for the Forestry Research Institute of Nigeria (FRIN) dropped from the equivalent of US$10.9 million in 1981 to US$0.2 million in 1991 (Odeyinde and Abu 1992). FRIN has been forced to find other sources of funding to support research programs, including the sale of construction materials and other products produced by the institute, sale of consultancy services to industry, special research projects for other government agencies, and international donor agencies.

According to available survey results (Gregersen 1984), some 10 to 15 percent of total...
administrative time in developing country forestry research organizations is spent seeking funds. In many forestry research organizations, with less assured levels of funding, the time spent in seeking additional sources of funding may far exceed this. Seeking and cultivating new funding sources is a critically important part of the forest research manager's job.

Funds needed to maintain the basic operation of a forestry research organization are called core or hard funds. For governmental organizations, these funds are usually obtained through the appropriations process. Additional funding may be obtained to operate specific projects for limited periods of time; this we call project or soft funds. In either case, some of the funds obtained may be tied or committed, and some are discretionary, in terms of the administrator's ability to shift them from one activity to another.

Tied or committed funds are those that are earmarked for specific expenditure items, e.g., salaries of the permanent employees, monies granted or appropriated for specific buildings or construction, and various types of basic operating costs. Discretionary funds are those which can be allocated by research administrators at their discretion. They can be devoted to a variety of activities, depending on the needs and timing of such needs. Most managers maintain some discretionary funds in a contingency account to be used to meet unforeseen expenses, such as unanticipated increases in costs, breakdown of essential equipment, storm damage, or any number of other contingencies.

### Need for Core Funding

All forestry research organizations (FROs) need some long-term core funding to ensure their stability and sustainability through time. In order to attract and hold high-quality researchers, one needs to be able to make long-term commitments of resources over a period of several years. Long-term research, such as many growth and yield studies, hydrologic research, or broad ecological inventories, which may take a decade or more to complete, require a stable source of funding. It may take years to build up a competent staff of research scientists who have the capability of conducting a program of high-quality research in a particular area. Core funding is needed to support such long-term development of professional capabilities. Core funding also is required to maintain the research infrastructure and research support services that forestry research installations require.

In most cases, core funding is obtained from the higher authority that governs the FRO, e.g., a ministry, the university administration, or some other national-level decision-making body.
in the case of independent research institutes. A good rule of thumb is that core funding should not fall below 30 percent of total funding, or the organization will find itself in a vulnerable position. Core funding around 50 percent is preferred and 60 percent or more can be considered to be comfortable in terms of organizational survival and long term operation. In fact, however, many FROs are forced to operate with only 15 to 20 percent core funding. In some cases, as much as 90 percent or more of the core budget is tied to salaries and related fixed expenditures. Major adjustments can come only through retirements or resignations, or through the transfer or dismissal of personnel.

It is risky to rely upon short-term project-based funding in the hope that such grants will be renewed repeatedly. Funders of short-term projects frequently are unwilling (or unable) to commit funds over a long period of time. Often they seek to fund projects that can create a highly visible product within a short period of time. Program emphasis can shift to entirely new fields of interest and support, cutting off funding for projects previously supported. Then too, sources of funding may not match the research priorities developed in strategic planning. The resulting program of individually funded projects may be more a collection of diverse independent studies, than a coherent program to address national needs.

Developing a sound, detailed funding plan is particularly critical for the FRO operating on a small core budget in relation to total funding. To keep the FRO running smoothly over time, advance planning of funding and projects is essential. The governing body of the FRO needs to be fully informed about the ratio of core to soft funds, so it can make appropriate decisions concerning future budget allocations. Contradictions in policy may arise and have to be resolved. On the one hand, policy may encourage acceptance of new project funding when it becomes available from outside sources; on the other hand, policy may require core funding to be at some specified level in relation to soft funding, and that minimum ratio would preclude acceptance of more outside contract research. The governing body either can change policies or it can increase core funding to let the FRO grow.

In almost all cases, a public FRO has to submit a budget request for at least part of its funding to some higher governmental authority. In some cases, the budget prepared by the FRO is submitted in total to the appropriate authority (ministry, department, planning commission, etc.). That authority then decides on the funding level, given other budget requests. The budget is, essentially, the funding plan in this case. But in other cases, the FRO will have to prepare separate budget requests for a number of different potential sources of funding. In this case it
also will need a separate annual budget which consolidates all sources in relation to their application to funding needs. A matrix with funding needs as row or line items and sources as column headings can be a useful tool for keeping track of sources by needs.

### Potential Sources of Research Funding

Most FROs obtain some funding through sources other than a regular government budgeting process. Table 7.1.1 provides information on sources of funding for FROs, based on a survey of both developing and developed countries (Gregersen 1984). It is interesting to note that on the average, forestry research organizations in both developed and developing countries obtain roughly 60 percent of their funding from regular budget appropriations, about 25 percent from public grants or contracts for specific projects, about 10 percent or so from private grants and contracts, and the rest from miscellaneous sources.

#### Table 7.1.1. Percent of funding obtained from various sources by forestry research organizations in developed and developing countries, by type of organization and region.

<table>
<thead>
<tr>
<th>Type and Location of Organization</th>
<th>Regular budget appropriations</th>
<th>Private grants or contracts</th>
<th>Public grants or contracts</th>
<th>Other</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>76.0</td>
<td>3.9</td>
<td>18.8</td>
<td>3.3</td>
<td>65</td>
</tr>
<tr>
<td>University</td>
<td>40.1</td>
<td>18.5</td>
<td>40.4</td>
<td>1.0</td>
<td>45</td>
</tr>
<tr>
<td>Other</td>
<td>39.0</td>
<td>21.2</td>
<td>23.4</td>
<td>16.4</td>
<td>7</td>
</tr>
<tr>
<td>Developed countries*</td>
<td>59.4</td>
<td>10.7</td>
<td>27.3</td>
<td>26</td>
<td>70</td>
</tr>
<tr>
<td>Developing countries</td>
<td>59.3</td>
<td>10.8</td>
<td>25.6</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Europe</td>
<td>55.2</td>
<td>9.6</td>
<td>31.5</td>
<td>37</td>
<td>48</td>
</tr>
<tr>
<td>Latin America</td>
<td>46.5</td>
<td>10.7</td>
<td>36.4</td>
<td>64</td>
<td>18</td>
</tr>
<tr>
<td>Asia (developing)</td>
<td>79.5</td>
<td>6.1</td>
<td>12.1</td>
<td>23</td>
<td>13</td>
</tr>
<tr>
<td>Asia (developed)</td>
<td>68.8</td>
<td>15.1</td>
<td>16.1</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Africa</td>
<td>56.5</td>
<td>15.8</td>
<td>23.9</td>
<td>38</td>
<td>13</td>
</tr>
<tr>
<td>Middle East</td>
<td>86.9</td>
<td>1.8</td>
<td>11.3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>North America</td>
<td>69.0</td>
<td>9.2</td>
<td>21.8</td>
<td>0</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: Gregersen 1984.

* "Developed" includes Europe, Asia-developed, and Canada.

* "Developing" includes Latin America, Asia-developing, and Africa.

Often, research managers or administrators rely primarily on traditional sources of funding, and fail to take advantage of some of the more nontraditional funding sources that might be available to support their research programs. In some cases, of course, they
have no choice: they are restricted by law or regulation to specific sources. However, in most cases they have some flexibility to go out and seek additional funding from nontraditional sources.

Since many sources are restricted to one kind of activity or another, proposals have to be matched to sources quite carefully. A danger is that FROs may develop proposals that fit the specifications and interests of potential source institutions, but not the real needs of the FRO or the nation which it represents. Hopefully, funding plans can be developed to fit the funding objectives of a potential source without compromising the basic goals and needs of the FRO.

Table 7.1.2 (adapted from McGaughey and Gregersen 1988) lists a number of potential sources and mechanisms for generating funds and financing forestry research. Out of this list, the research manager may find only a few sources that appear to have immediate potential. However, other sources can be pursued over time. In many known cases, there is joint funding of forestry research by several sources, including, for example, national public agencies and bilateral international donors. In such cases, a joint funding plan needs to be developed which specifies each funder’s share of the total and the responsibilities of the forestry research organization in relation to each funder.

Of the potential sources for research funding listed in table 7.1.2, the most likely ones to support public forestry research are: public sources internal to the country, public external sources (international bilateral and multilateral), and private external sources such as foundations and nongovernmental organizations within the country and international nongovernmental organizations. For a selected listing of some national and international organizations that are potential sources of funds for forestry research projects and programs, see appendix 7.1. The international sources deserve special comment.

### International bilateral and multilateral public sources

Many FROs depend heavily on foreign sources of funding. Based on available surveys, percentages range from 40 percent international funding in the case of Africa to 5 percent in Asia. Overall, it is estimated that some 20 to 25 percent of public forestry-related research in developing countries is funded by international donors. The proportions vary widely among FROs, but the point still remains: international funding of forestry research is important, and some effort needs to be devoted to developing strategies for obtaining international funding.
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<th>MECHANISMS FOR GENERATING FUNDS</th>
<th>MECHANISMS FOR FINANCING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Internal Sources</strong></td>
<td></td>
</tr>
<tr>
<td>• taxation and regular budget</td>
<td>• direct government expenditure</td>
</tr>
<tr>
<td>• public borrowing</td>
<td>• grants and subsidies</td>
</tr>
<tr>
<td>• forest funds, revenues</td>
<td>• government loans through</td>
</tr>
<tr>
<td></td>
<td>development banks or other</td>
</tr>
<tr>
<td></td>
<td>agencies</td>
</tr>
<tr>
<td></td>
<td>• aid in kind</td>
</tr>
<tr>
<td></td>
<td>• cofinancing with private sector, multinationals, etc.</td>
</tr>
<tr>
<td><strong>Public External—Bilateral Sources</strong></td>
<td></td>
</tr>
<tr>
<td>• taxation and regular budget</td>
<td>• loans</td>
</tr>
<tr>
<td>• public borrowing</td>
<td>• grants</td>
</tr>
<tr>
<td></td>
<td>• aid in kind (technical assistance, food, etc.)</td>
</tr>
<tr>
<td></td>
<td>• cofinancing</td>
</tr>
<tr>
<td><strong>Public External—Multilateral Sources</strong></td>
<td></td>
</tr>
<tr>
<td>• subscriptions from countries</td>
<td>• loans</td>
</tr>
<tr>
<td>• borrowing in world capital markets</td>
<td>• cash grants</td>
</tr>
<tr>
<td>• reinvested earnings</td>
<td>• grants in kind (food, etc.)</td>
</tr>
<tr>
<td></td>
<td>• cofinancing</td>
</tr>
<tr>
<td><strong>Private Internal Sources—Industry</strong></td>
<td></td>
</tr>
<tr>
<td>• equity capital</td>
<td>• direct private investment</td>
</tr>
<tr>
<td>• retained earnings, savings</td>
<td>• cofinancing with public or multilateral</td>
</tr>
<tr>
<td>• borrowing (domestic and international capital)</td>
<td>• lending/credit</td>
</tr>
<tr>
<td>• endowments</td>
<td>• private grants, gifts, etc.</td>
</tr>
<tr>
<td><strong>Private Internal Sources—Individuals, NGOs</strong></td>
<td></td>
</tr>
<tr>
<td>• savings, labor, land</td>
<td>• direct investment on own land</td>
</tr>
<tr>
<td>• borrowing/credit</td>
<td>• investment on common lands</td>
</tr>
<tr>
<td>• grants, subsidies, etc.</td>
<td>• lending to others</td>
</tr>
<tr>
<td></td>
<td>• cofinancing</td>
</tr>
<tr>
<td><strong>Private External Sources—NGOs</strong></td>
<td></td>
</tr>
<tr>
<td>• endowments</td>
<td>• lending</td>
</tr>
<tr>
<td>• grants, gifts</td>
<td>• subsidies</td>
</tr>
<tr>
<td>• contracts</td>
<td>• direct investment</td>
</tr>
<tr>
<td></td>
<td>• technical assistance</td>
</tr>
<tr>
<td></td>
<td>• cofinancing</td>
</tr>
<tr>
<td><strong>Private External Sources—Industry, Multinationals, Banks</strong></td>
<td></td>
</tr>
<tr>
<td>• retained earnings</td>
<td>• direct foreign investment</td>
</tr>
<tr>
<td>• borrowing/credit</td>
<td>• loans</td>
</tr>
<tr>
<td>• endowments, gifts, etc.</td>
<td>• grants</td>
</tr>
<tr>
<td>• contracts</td>
<td>• cofinancing</td>
</tr>
</tbody>
</table>

If managing an R&D program, foreign assistance can significantly enhance and improve technology transfer efforts. Technical assistance should be a key feature of most programs and integrated into the overall strategy. It is important to carefully select and match the technical assistance needs of the research organization. The early stages of funding sometimes provide an opportunity to build a local institution capable of playing an important role in the long-term success of the program. The Fund-type programs of the World Bank and other development banks can be an attractive source of financing because they provide long-term, low-interest loans, which may include the funding for operational costs during the implementation phase of the program.
Integrating internationally-funded research into the overall program of a FRO in a developing country can be a significant challenge. Quite often, research funded by international agencies is much better supported than the domestic component of a program, thus leading to potential jealousies among personnel. There also is the potential danger of isolation and lack of integration in the overall program, and of pressures from outside to shape and direct the foreign-funded research in ways not particularly compatible with the FRO's overall research plan. The research manager has to face these challenges without compromising the overall strategic plan for the FRO. From a very early stage the manager has to start planning for a smooth transition once the outside funding terminates.

If managed appropriately, funding from foreign sources can provide significant benefits. This is especially true if it provides technical assistance and experienced expatriate researchers who can augment and complement existing national scientists. Foreign funded research can help strengthen national research capacity. Foreign involvement can lead to longer term opportunities for networking and contacts with the rest of the scientific community working on similar problems. It also can involve training abroad which, if properly handled, can lead to eventual benefits. Often, the foreign funding agency will provide expatriate scientists to fill in during absences of key domestic scientists involved in training programs.

In seeking foreign funding and support for research programs, a manager with no prior experience with such sources is well advised to discuss a plan of action with others in the country who have had experience. Agencies such as FAO have experts with experience in designing and managing research-related programs, who can be contacted for advice. Many developed country forest services have scientific expertise that is available for free on a short-term basis to advise developing country FROs on the technical content of proposed programs. Such sources of expertise should be sought and utilized in designing funding proposals for foreign sources.

International nongovernmental sources
Most international nongovernmental organizations (NGOs) are not in a position to provide funding for public forestry research organizations. Nevertheless, there are opportunities to connect with many of them in joint research and development projects and thus to obtain inputs of technical assistance and support in kind. Such groups as CARE, the World Wildlife Fund, and various Canadian and European NGOs are involved with applied forestry research in many developing countries. There always are
opportunities to develop relations with such organizations that can further the interests of both the NGO and the domestic FRO.

There are many large, nonprofit foundations that fund significant amounts of research in developing countries. Some, such as the Rockefeller Foundation, the Ford Foundation, The MacArthur Foundation, and others, have made major investments in forestry research in developing countries. It is important to make contacts with these groups in order to explore areas of potential common interests. Consulates of major donor countries can provide information on the groups that are located in a particular country.

**Domestic public sources other than parent ministry or agency**

Often there are national level public agencies outside of the forestry and forest products sectors which could be tapped for funding for specific types of forestry research. These may include agencies associated with forest policy, agroforestry, watershed management, forest products, and forest utilization. Such sources should be sought out and contacts initiated. If the strategic plan for research has been prepared in the proper fashion, it should contain sections which relate the proposed research to such broader national development and conservation issues as employment, energy, environmental protection, and food security. Such a plan thus provides a starting point for contact and discussion with agencies outside of forestry.
Some forestry research organizations orient their research agenda toward their donors' research priorities, rather than developing an agenda that is compatible to the needs of their country and matches the capacity of the organization. How is this a problem? In answering this question in the space below, list some of the negative impacts that you think might be the result of this kind of practice.

1. 

2. 

3. 

4. 
1. The forestry research organization might lose focus by conducting low priority research inappropriate to the organization’s mission, goals, or objectives.

2. Research results obtained might not be of use in the country, since the research activities focused on the donor’s needs and desires (and perceptions of national needs) rather than being derived from stakeholder views.

3. National problems might not be addressed, since scarce human and material resources were devoted to problems of the donor’s choice. Further, opportunities for change and improvement are lost when scarce resources are diverted.

4. Because the research organization might have taken on research activities for which they were ill prepared to conduct, the research results obtained might be of poor quality, and thus be of little use to the donor or national stakeholders.
What are the advantages and disadvantages of short-term project funding? Use the table below as you answer this question.

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What are the advantages and disadvantages of long-term funding? Use the table below as you answer this question.

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### Comment 2

**Advantages of Short-term Funding**
- permits expansion of research program
- allows for research on discrete, short-term projects
- enables the purchase of equipment that might be used to further other activities once the short-term funding terminates

**Disadvantages of Short-term Funding**
- project sometime chosen for visibility, rather than need
- pressure to conduct research of donor choice, rather than stakeholders
- short-term nature not suitable for long-term forestry research
- risky to depend on short-term funds being renewed
- difficult to maintain staffing levels as short-term funding fluctuates over time
- are tied to specific projects, restricting managerial flexibility and initiative
- considerable staff time spent preparing proposals and funding applications

### Comment 3

**Advantages of Long-term Funding**
- Permits long-term planning
- Allows for long-term research programs appropriate for forest systems
- Promotes stability among research personnel staffing patterns
- Assists in the maintenance of research infrastructure and research support services

**Disadvantages of Long-term Funding**
- Can be tied to specific projects, reducing managerial flexibility and initiative
- Difficult to obtain
- Large percentage tied to salaries and fixed costs, again limiting managerial flexibility and initiative
In the space provided below, name five sources of funding for forestry research organizations that might be available in your country.

1. 
2. 
3. 
4. 
5. 

Is your organization tapping these sources of funding?

Forestry research funding is generally channeled to research organizations through a number of mechanisms, an example of which might be private grants. In the space provided below, list 5 other mechanisms by which forestry research is financed.

1. 
2. 
3. 
4. 
5.
Five (5) sources of funding for forestry research organizations might be:
1. Regular budget appropriations of the national government;
2. Multilateral donors;
3. Bilateral donors;
4. Private industry; and
5. Private donors, nongovernmental organizations (NGOs) and foundations.

There are other sources of funding as well. What others can you think of?

How well is your organization tapping these sources?

Mechanisms by which forestry research is financed might be:
1. Direct government expenditure;
2. Grants and subsidies;
3. Government loans through development banks;
4. Cofinancing with the private sector, multinationals, etc.;
5. Loans;
6. Aid in kind (technical assistance, food, etc.); and
7. Direct private investment.
As a research manager, much of your time and attention is focused on the funding of your organization's research activities. Funding for forestry research can be obtained from a variety of sources, and is channeled through a number of mechanisms. Research funding may be associated only with specific projects (soft or project funds), be allocated to maintain the basic operations of your organization (hard or core funds), or be composed of some combination of hard and soft money.

This study unit examined ways in which forestry research is financed. By completing this study unit, we hope that you better understand the sources from which research funds are derived, and the mechanisms through which these funds are channeled. By clarifying the advantages and disadvantages of short-term and long-term funding, you are better able to build a funding portfolio that better suits the needs of your organization. And by achieving a deeper understanding of some of the opportunities for financing research activities, you should be better prepared to identify and solve funding and financing problems, or avoid them before they occur.

For further information about the financing of research programs and organizations, you may wish to refer to some of the references cited at the end of the module. A key article directly related to the topics covered in the module, and cited in the text, is reprinted for your use in the section on readings at the end of the module.
Objectives

When you have completed this study unit you should be better able to:

- structure and outline funding requests and proposals to address both the requirements of the funder and your own research institution;
- identify key criteria and/or requirements which the potential funding organization considers to be important to project approval;
- describe a procedure that can be used to evaluate proposed research projects and programs; and
- use this evaluation procedure to judge research project proposals.
Developing and Evaluating Research Proposals

Objectives
When you have completed this study unit you should be better able to:

• structure and outline funding requests and proposals to address both the requirements of the funder and your own research institution;
• identify key criteria and/or requirements which the potential funding organization considers to be important to project approval;
• describe a procedure that can be used to evaluate proposed research projects and programs; and
• use this evaluation procedure to judge research project proposals.

To develop a potential funding source into an actual funding provider, you will be required to prepare and submit a well-written proposal. When preparing proposals, research managers must understand and take into account not only their own organization's goals and objectives, but also the motivations and objectives of the funding organization, the amount of money potentially available, the restrictions and limitations of the funding organization, and the key decision points and decision makers in the organization. But successfully securing research funding takes more than just writing a grant proposal. A successful funding effort is really a multistep process that requires extensive planning and evaluation of ideas, and the gathering of internal and external support prior to writing the proposal. The ability to craft a successful grant proposal is an important and necessary skill of researchers and research managers alike.

In this unit we'll take you through the basics of proposal writing. You'll learn the fundamental steps to take before you even begin to write. We'll suggest tips on how to structure and direct your proposals, while alerting you to be sensitive to the requirements of the funding organization. We'll also point out some common problems when proposals are matched too closely to the requirements of the funding sources, and not to the real needs of your research organization or your nation.

As part of your job as research manager you may be required to evaluate research projects or programs proposed by your staff or by others. Time is always short, and funds are normally not available to conduct a complex, formal evaluation of these proposals. Managers need simple, quick methods that can be easily used to evaluate research proposals. While efforts have been made to develop quantitative methods to evaluate research proposals (for example, Bethune and Clutter 1969, and Claxton and Renzi 1972), most have proven to be complex and difficult to
apply and have seldom been used in practice (Lundgren 1986). Thus, in keeping with the practical nature of this training course, in this unit we’ll show you how to use a more qualitative approach to evaluating research proposals that other research managers have found useful.

If you are interested in learning about simple but effective guides for preparing and evaluating research proposals, then proceed ahead to complete this unit. Although it is oriented primarily towards proposals being submitted for external funding, the same general principles apply to preparing research proposals for funding within the organization.

### Developing Research Funding Proposals

The ability to develop well-crafted grant proposals is an increasingly important skill required to obtain funds to finance research projects or programs. This unit provides an overview of the research funding application process. It also provides a brief introduction to proposal writing, focusing on the essential components that should be included in any proposal: title page, summary or abstract, problem statement, objectives, methods, budget, dissemination plans, and attachments. Much more detail about grants-seeking techniques is given in books such as Bauer (1988) and Reif-Lehrer (1989).

### The Funding Application Process

There is considerably more to developing a research proposal than simply writing it. Work is required both before and after the proposal is written. In developing research proposals, one must:

**Locate potential sources of funding.** Research managers often spend a considerable amount of their time in locating potential sources of funding. Experienced research managers generally have developed a good awareness of both public and private sources of funding, both within and outside of the country. Some potential sources of funding are suggested in study unit 7.1 (see also McGaughey and Gregersen 1988).

**Contact likely funding sources.** Once potential research funding sources have been located, initial inquiries or contacts to determine their areas of interest may help to identify the most likely sources. These contacts also bring your interests and organization to the attention of potential funders. Funding programs of organizations change, and it is always possible to influence future programs, if existing programs are not already related to your research interest. Or, it may be possible to reorient your planned programs to take advantage of funding that is available.
Clarify qualified research areas supported, eligibility requirements, and application procedures. Before writing the research proposal, it is critically important to make sure that the research being proposed will fit the program areas supported by the funding source, that you and/or your organization are indeed eligible to apply for funding, and that the application procedures, including the required format and content of the proposal, are well understood. It is discouraging to prepare a proposal, only to find out that what you are proposing is not what the grantor had in mind.

Evaluate your research capabilities and interests and compare with the interests of potential funders. Once the details regarding what research is acceptable to each potential funding source and the application procedures are known and understood, it is necessary to evaluate your research capabilities and interests and compare these to the interests of each potential funding source to determine whether or not you are eligible to apply for the funding. Preparing research proposals can take a considerable amount of time and effort, and is not to be undertaken lightly. It will be up to you, the research manager, to decide which of perhaps several sources of funding is most likely to meet your needs and provide funding. Before investing a lot of time in preparing proposals, you will want to be sure that you have selected the most promising sources of funding.

Cultivate personal contacts within funding agencies. Once contacts have been made with funding organizations, it is well to develop and cultivate an ongoing personal relationship with one or more key personnel of those organizations to keep them informed about your research interests and capabilities. Having people within an organization personally informed about you and your organization can be an advantage when decisions must be made among competing proposals.

Marshal internal and external support for your application. Before submitting any proposal for external funding, it is well to ensure that it has the support of your own staff and any required approval by higher-level administrators and others in your organization or agency who may be concerned about the proposed research. This is especially true when there is a need to provide matching funds from within the organization, commitments of personnel, or other contributions to the proposed research. Letters of support from peer groups, research user groups, or others, testifying to the importance of and need for the proposed research, and to the research capabilities of your organization, often are required by the funding source.
Write the proposal. It is well to plan out, step by step, the process by which the proposal will be prepared. Time must be allowed not only for preparing the initial draft, but also for any required or desired reviews, revisions, preparation of the final draft together with supporting documents, and transmission of the documents to the funding organization. The exact format to be followed in writing a proposal may be specified by the funding agency. The following section suggests some of the information that a proposal should contain, in case no format is specified. In writing the proposal, the potential viewpoints of the funding organization, and of potential reviewers who may be asked to evaluate the proposal, should be kept in mind. As the writing progresses, you may want to consult your contacts in the funding organization to clarify important points, and to get their input on key questions.

Submit and follow up on the proposal. Deadlines on submitting proposals are often firm, and failure to submit a proposal by the specified date may invalidate your application. In planning for the preparation of the proposal, enough time must be allowed to complete the proposal in its final form for submission before the due date. After submission, it is wise to check with the funding organization to make sure that the proposal was received, and to get updated information about the decision process. Periodic contacts with key people in the funding organization will keep you informed about any changes in funding procedures, and will indicate to them your continued interest in the outcome. It is well to keep informed about the proposal decision process. Organizations have been known to lose or misplace things. If something like this happens, it is well to be aware of it as early as possible, so corrective action can be taken.

Format and contents of a research proposal
Although the exact format for a research proposal may vary, depending upon the requirements of a funding agency, most proposals should contain the following information:

Title page. Some granting agencies have standard formats for the title page. Whatever the format, the key to the title page is to include all required information and more. The title page should contain: (1) the name of the program you are applying to, (2) the address of the office that handles the program and the name of the contact person, (3) your return address and phone number, and (4) the title of your proposal. The title for a proposal is very important, because it is read first. A poor title may result in your proposal not receiving adequate attention. An ideal title: (1) describes the proposed research project or program, (2) expresses the end result of the project rather than the methods, (3) indicates the benefits to clients, and (4) is short and easy to remember.
Summary or abstract. The summary should motivate the reviewer to continue. If the summary does not capture the interest of the reviewer, the rest of the proposal may not be read. It should be succinct, summarizing the key points of the proposal rather than repeating them. The summary should be written after the rest of the proposal is completed.

Problem statement. The problem statement should create a sense of importance and immediacy about the proposed project. It is important not to assume that the funding agency has the same level of concern or sense of urgency about the project as the grant seeker. This sense of urgency should be created by documenting the need for the project rather than expressing your opinion about the need. Such documentation may include statistics from past research, quotes from experts in the field, and statements of need or statistics from the funding agency's own publications. At the end of the needs statement, the case can be made that your research organization is best suited to deal with this problem, i.e., you have the expertise, staff, and facilities needed to successfully carry out the project.

Objectives. Objectives are the specific, measurable results which the proposed research project or program is designed to achieve within a given time frame; they tell the funding source what will be accomplished at the end of the project and who will benefit from the research. Objectives are tangible outputs that address the problem identified in the preceding section. A common mistake is to discuss tasks or methods in the objectives section of a proposal, rather than emphasizing end results and outputs.

Methods. The methods section describes how the objectives will be accomplished. It should describe the activities that will be undertaken and how they fulfill objectives, research methods that will be employed, staffing and responsibilities for the various activities, and materials and equipment needed. In some cases, separate sections following the methods section may be desirable to describe the time schedule (sequence and flow of activities) and project staff (assigning responsibility to specific individuals for each part of the project).

Budget. The budget should be closely tied to the description in the methods section of activities that will be undertaken. The funding source may provide guidelines for preparation of the budget. If not, the budget should include at minimum the following items:
1. Personnel Expenses
   • salaries and wages (specify for each of the individuals involved)
   • fringe benefits
   • consultants/contracted services (specify)
   Subtotal of Personnel Expenses

2. Nonpersonnel Expenses
   • equipment (specify)
   • supplies
   • travel (specify)
   • other nonpersonnel costs (specify)
   Subtotal of Nonpersonnel Expenses

3. Project Total

Each of the budget categories should be broken down by total expenditure, the amount donated or in-kind, and the amount requested from the funding source. If your organization is providing funds, personnel, or other resources, and if there are other funding sources contributing to the proposed research, it may be necessary to clearly indicate for each category of expenses just how much each would contribute towards the total expenses of the project.

Dissemination plans. It is important to specify how the results of the project or program will be disseminated to users, through research publications, technology transfer or extension publications, training courses, sponsoring a seminar or conference, presentation of results at regional, national, or international conferences, or other means. A separate line in the budget may be added for funds needed to carry out dissemination activities.

Attachments. Materials that back up your proposal should be included in the attachments or appendix. Attachments could include copies of your organization’s publications that relate to the proposal, the vitae of key personnel, letters of endorsement, a list of other funding sources that will be approached for funding, and so on. A separate contents page should be included for the attachments.

Proposal cover letter
In submitting your proposal to an outside funding agency, the cover letter accompanying your proposal is an important part of the documentation. The purpose of the cover letter is to reintroduce yourself to your contact at the funding agency. You should have had previous contact with a particular individual on the funding organization’s staff, and you may want to remind them of this contact and the changes you have made in your proposal.
based on their input. Generally, cover letters should be short, but they should motivate the recipient to give serious consideration to your proposal by pointing out the importance and need for the proposed project or program and your or your organization’s ability to successfully carry out the proposed research.

Writing tips and style

It is important to follow closely any guidelines provided by the potential funder, even if they do not appear logical. Your writing style should reflect what the funding agency wants and what the reviewers will be looking for. If you have questions regarding the style of writing, it may help to contact appropriate individuals at the funding agency to obtain clarification before the proposal is written. Such contacts may also help to gauge their level of familiarity with your proposed area of research.

Evaluating Research Proposals

Many criteria have been suggested for evaluating and assessing research proposals. For example, the National Science Foundation of the United States has used four criteria to evaluate research proposals submitted to them for funding:

1. Research performance competence
   - Are the investigators capable?
   - Is the approach technically sound?
   - Are there adequate institutional resources available?

2. Intrinsic merit of the research
   - Is it likely that the research will lead to new discoveries or fundamental advances within its field of science or engineering, or have substantial impact on progress in that field or in other scientific and engineering fields?

3. Utility or relevance of the research
   - Is it likely that the research can contribute to the achievement of a goal that is extrinsic to or in addition to the goals of the research field itself?
   - Is it likely to serve as the basis for new or improved technology, or assist in solving societal problems?

4. Effect of the research on the infrastructure of science and engineering
   - Does this research have the potential to improve the understanding, quality, distribution, or effectiveness of the nation’s scientific and engineering research, education, and manpower base?

*From appendix B, attached to NSF-81-384, National Science Foundation, Washington, D.C. Approved by the National Science Foundation 8/21/81.*
These four criteria provide an excellent basis for judging research proposals. However, because they were developed to fit the national program objectives of the National Science Foundation, which includes a considerable amount of basic research, they omit some criteria that may be important to an applied research organization with a more specific mission and program of research activities.

The following criteria, based in part upon those given above, may be better suited to judging research proposals within forestry research organizations:

• Is the proposed research scientifically sound?
  - Do the proposed research methods for conducting the research and analyzing the results follow generally accepted scientific principles?
  - From the standpoint of research methodology, if the research were carried out as described, would the anticipated results be achieved?
  - Is the proposed research judged acceptable by scientific peers?

• Does this research problem fit with the organization's research mission?
  - If the research were successfully completed, would this help to achieve the organization's goals?
  - Can the choice of this proposed research be justified to those who will be asked to fund the research?

• Could the proposed research be carried out successfully in time to be useful?
  - Are the technical skills and other human resources required available?
  - Will the funds, facilities, equipment, supplies, and other resources be available when needed?
  - Is there a reasonable chance of success?
  - If not, are the potential gains, if successful, large enough to offset the low probability of success?

• If the proposed research were carried out successfully, would the results be used by the intended users?
  - Could the results be used by the people for whom they are intended?
  - Are they likely to be used?

• Would the proposed research solve a problem that is important to science or to society?
  - Would the results be widely used?
  - If the results were widely used, what differences would it make?
  - What activities would be affected, and to what extent?
  - Who would be affected by the adoption of the research results?
Would the environment be adversely impacted by either the research itself or by the adoption of the research results?
- Will the research help maintain and enhance the environment?
- What adverse environmental impacts are likely to result (if any), and where?
- How severe would the impacts be?
- How widespread would they be?
- Who would be affected, and over what time period?

Will the benefits to society from the proposed research exceed the costs?
- What are the costs of implementing the research and disseminating the results?
- What benefits to science or to society are likely to follow from adoption and use of the expected results?
- Are the expected benefits large enough to justify the costs?

These seven criteria can be summed up by the following questions that should be asked of every research proposal:

- **Is it scientifically sound?** That is, are the proposed research methods acceptable to the scientific community?
- **Is it appropriate?** That is, does it fit with our research unit's mission, goals, and research program?
- **Can it be done?** That is, is it something that our organization could do within a reasonable time, with the resources available, and with a reasonable chance of success?
- **Could it and would it be used?** That is, if the research were successful, could the results be used by the people for whom they are intended, and would they be used?
- **Is it important?** That is, would the results make a substantial contribution towards solving an important problem in science or in society?
- **Are there unacceptable economic, social, or environmental impacts?** That is, if the research is successfully completed, and the results widely adopted, is there likely to be an unacceptable level of economic, social, or environmental impacts?
- **Is it worthwhile?** That is, will the expected benefits to society from the successful completion of the research and subsequent adoption of its results offset the costs of carrying out the research?

These questions provide a minimum set of criteria for judging proposed research. They are questions that individual scientists should consider in developing a research proposal. To be
acceptable, any proposed research should pass all of the above screening questions. If the answer to any one of the above questions is "no," then the research proposal should be rejected, modified so as to be acceptable, or set aside for further consideration, unless there are strong reasons to decide otherwise.

If scientific peers judge that the proposed research is not scientifically sound, as stated in the proposal, then there is reason to question the acceptance of the proposal.

If the proposed research does not fit the unit's research mission, is not part of the approved program of research, and does not contribute towards the goals of the research organization, there may be grounds for not accepting the proposal. A research organization that relies too heavily on outside funding of research projects is in danger of having its research program driven by the availability of funding, rather than by the research needs of society and science. Research programs driven by funding alone can become fragmented, with no overall strategy for addressing the critical problems facing the people it serves. It can become driven by the priorities of the various donors, rather than the priorities established within the society it exists to serve. The results produced may not be relevant to meeting the needs of the organization's clients. If this happens, it may erode support for the organization within its own society.

If the resources needed to carry out the proposed research (for example, qualified scientists or technicians, special facilities and equipment, funding) are not available now, and are not likely to be available in time to carry out the research, then regardless of how scientifically sound it may be and how well it fits with the organization's goals and research program, the research proposal may have to be set aside until the necessary resources do become available, or the proposal is modified to utilize the resources that are available.

If the results produced by the proposed research cannot be or are not likely to be used or adopted by the intended users, then there is reason to question the wisdom of accepting the research. If the expected adoption and use of the proposed research is not known, then there is reason to attempt to find this out before accepting the proposed research.

If the problem that would be solved by the proposed research is judged to be of relatively little importance to either science or society, or if the results of the research would be adopted by relatively few of the intended clients for the research, there is reason to question whether the research should be done, unless other considerations (for example, training of inexperienced researchers) weigh strongly for acceptance.
If the research is likely to result in a high risk of an unacceptable level of adverse environmental, social, and economic impacts, either from the research itself, or from the future adoption and use of the research results, then a more thorough analysis should be made of the potential impacts on society.

Finally, if the best available information indicates that the expected gains to science or to society from the adoption of the expected results of the research do not outweigh the costs of the research, there may be good reason to reject the research proposal. In judging the contributions of proposed research to science or to society, it should be recognized that if the research is primarily basic, and the intended users are mainly other scientists, then the important values to be considered are the potential contributions that this research might make to science. Judging the potential contributions to science is best conducted by scientific peers. In contrast, if the research is mainly applied, and the results are intended to be used by forest landowners, managers, and/or users to change the ways in which forests and related natural resources are managed or used, then the important values to be considered are the anticipated kinds and intensities of changes, and the extent of their social, economic, and environmental impacts. Judging the potential contributions to society is best conducted by the potential adopters and users of research results, and by those who are likely to be affected by the use of the results.

Answering the set of questions outlined above will not provide an automatic judgement as to whether or not a particular research proposal should be accepted. However, the answers to these questions will provide research managers with information that will be helpful in making an informed decision as to whether or not the proposed research is acceptable.

These or similar criteria can be used to develop a simple rating format that may be helpful in judging research proposals. For example each person rating a given research proposal could be asked to indicate (by checking the appropriate box) the rating they would give to the proposal for each criterion being used to judge proposals. A simple three-value scale of low, medium, and high, (or acceptable, acceptable with specified revisions, or unacceptable) with space for intermediate ratings if desired, could be used. Often, a simple scale such as this is adequate for screening out those proposals that are obviously undesirable or unacceptable, and is more easily understood and applied than a more complex scale. An example of a format that could be used in rating research proposals for a given set of criteria is provided in table 7.2.1. In this example, a proposal that ranked high for every criterion is a promising candidate for acceptance. A proposal that rates low in any of the criterion being used to judge the proposal is a potential candidate for rejection, and should be examined.
carefully to determine if the low rating is offset by some other desirable characteristics.

A rapid method to screen research proposals can be developed using the following four questions to be answered for each proposal:

• Does the proposed research fit the research mission and strategic plan for your organization?
• Can the research be done by your organization?
• If your organization does conduct the research, are the results likely to be used?
• Even if the research results will be used, will this make enough of a difference to justify the time and expense of conducting the research?

If the answer to any of these questions is no, then the research proposal would be rejected unless there is some other overriding consideration to justify accepting it.

An important argument for developing some such formal evaluation scheme is that it provides a consistent system for judging all proposals. Such a system also can be used to guide the development of research proposals so that they are more likely to meet the criteria being used to judge them.

Table 7.2.1. Format for rating research proposals, using a specified set of criteria.

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Below are the stories of two hypothetical research managers and how they go about trying to secure research funding support from outside donors. Review the descriptions and answer the questions which follow:

### Situation Analysis

#### Research Organization A

The research manager for this organization just heard about a new grant program launched by a major international forestry research donor. The manager is very excited about his organization's prospects for tapping into this new and large source of money, and immediately writes to the donor organization for the application guidelines, which he receives shortly thereafter. After holding a few meetings with his staff to determine the priority research topics they would like included, he begins to write the proposal, adhering to the guidelines requested by the funding organization. As he submits the application a few weeks later, well ahead of the application deadline, he feels cheerfully confident that his organization's request will be successful.

#### Research Organization B

The research manager for this second organization has also just heard about a new grant program launched by the major international forestry research donor. The manager is also very excited about her organization's prospects for tapping into this new and large source of money, and immediately calls the contact person at the funding organization and requests further detail about the new program, introducing herself and briefly describing her research organization's research program. At the same time, she requests the application guidelines, which she receives shortly thereafter. The research manager then conducts a few meetings with her scientific staff to determine their priority research topics, and to determine whether their proposed research is needed, solves important problems (important to both the research organization and the donor), and can be realistically implemented by the research organization. As she begins to prepare the application, she frequently calls the contact person at the funding organization to request clarification on particular requirements, and attempts to build a working relationship with the donor. She also contacts other people she knows in other organizations to gather additional information regarding the donor organization and its agenda. Now she begins to write the proposal, adhering to the guidelines requested by the funding organization, and orienting the entire proposal in a way that addresses the donor's priorities as well as the research organization's. She also attaches supportive letters of reference from prominent persons of authority, descriptions of her organization's past research accomplishments, and extensive resumes of her scientists and their accomplishments. As she submits the application package some time later, just by the application deadline, she feels cheerfully confident that her organization's request will be successful.
Activity 1

Which organization of the two above do you feel has a better chance to secure funding from this international donor? Why do you think so? Please write your response in the space provided below:

What could the research manager of organization A have done to better prepare the grant proposal? Please write your response in the space provided below:

Activity 2
We hope you choose organization B as the more likely to secure funding! The research manager of this organization understood that the process of applying for research grants includes a number of steps. First, she made sure the proposed research was important to both her research organization and the donor. She checked to ensure that her organization had the resources to conduct the research. Then she cultivated a personalized relationship with the donor organization, communicating with them right from the beginning and throughout the application process. She gathered important support from both within and outside the organization. Finally, when she did write the application, she made sure the research addressed not only her own organization's strategic goals, but those of the donor's as well. And she supported the application with extensive references, resumes, and past accomplishments of her research organization. With this kind of thorough preparation, organization B clearly has a much better chance at obtaining funds (though nothing is guaranteed!).

Research manager of organization A needs to learn that applying for research support grants is not simply a process of writing the grant proposal. Far from it! Applying for research grants is a process with specific, critically important steps, including:

- evaluate the relevance and importance of the research proposed and your ability to implement it;
- get to know the funding organization, its own agenda, and involve the donor organization's staff in the process of preparing your proposal;
- gather internal and external support for the research; and
- draft, revise, and submit the proposal, structuring the proposal according to the guidelines and to some extent, the agenda of the granting organization.
When faced with a similar situation, what approach does your organization take when applying for research support grants? Please write your response in the space provided below:

Self-assessment Activity

How could your organization improve its proposal preparation approach and methods? Please write your response in the space provided below:
Comment 3

We can't anticipate how you'll respond to this question, since we're not familiar with your organization. But we hope you thought about this carefully, since research funding from donor organizations provides critically important support for much of the forestry research being conducted worldwide!

Comment 4

Again, we can't anticipate how you'll respond to this question, since we're not familiar with your organization. However we hope that you'll list some of the approaches discussed in the comment to Activity 1.
Research managers often are asked to review research proposals from their own scientists and colleagues. What criteria do you think are important to use when evaluating research proposals? Please write your response in the space provided below:
When you prepare grant proposals you use nearly the same criteria you would use to evaluate them. But to review, there are several relatively simple criteria you can use to quickly evaluate whether a research project should be conducted. Stated as questions, they are:

- **Is it scientifically sound?** That is, are the proposed research methods acceptable to the scientific community?
- **Is it appropriate?** That is, does it fit with our research unit's mission, goals, and research program?
- **Can it be done?** That is, is it something that our organization could do within a reasonable time, with the resources available, and with a reasonable chance of success?
- **Could it and would it be used?** That is, if the research were successful, could the results be used by the people for whom they are intended, and would they use it?
- **Is it important?** That is, would the results make a substantial contribution towards solving an important problem in science or in society?
- **Are there unacceptable environmental impacts?** That is, if the research is successfully completed, and the results widely adopted, is there likely to be an unacceptable level of environmental impacts?
- **Is it worthwhile?** That is, will the expected benefits to society from the successful completion of the research and subsequent adoption of its results offset the costs of carrying out the research?
Summary

Securing research funding is of vital interest to forestry research organizations around the world. Funding support from granting organizations makes it possible to implement critically important forestry research on a large scale. Thus, it is of utmost importance that research managers be familiar with the process of developing grant proposals. Preparing grant proposals is essentially a four-step process. First, evaluate the research topic, its importance to your organization and to the donor, and your ability to implement it. Second, find a likely funding source, matching the research program to the donors own agenda and interests. Third, gather internal support for the proposed research to ensure adequate commitment to the research within your organization, and generate external support for your proposal. Then draft the proposal, addressing the donor’s application guidelines, requirements, and interests.

As research manager, you will need to evaluate research proposals from time to time. A rapid method to screen research proposals utilizes the following four questions:

1. Does the proposed research fit our research mission and strategic plan?
2. Can the research be done by our organization?
3. If our organization does conduct the research, are the results likely to be used?
4. And even if the research results will be used, will this make enough of a difference to justify the time and expense of conducting the research?

If you would like more information about developing and evaluating research proposals, we encourage you obtain and review the interesting articles identified in the literature cited and other references listed at the end of the module.
Objectives

When you have completed this study unit you should be better able to:

- describe different approaches to and types of budgeting;
- develop appropriate budget formats for research programs, projects, and studies;
- use a matrix approach to cope with dual budget systems; and
- recognize potential problems encountered in annual budgeting.

The Preparation of Budgets

According to the financial reports, the organization's financial statements provide a clear picture of how funds are spent. The financial report also shows how the organization's resources are allocated and managed.
Objectives

When you have completed this study unit you should be better able to:

• describe different approaches to and types of budgeting;
• develop appropriate budget formats for research programs, projects, and studies;
• use a matrix approach to cope with dual budget systems; and
• recognize potential problems encountered in annual budgeting.

Preparing Budgets

As a research manager, a good part of your time is spent preparing, defending, and implementing budgets. Budgets are required whether your organization is requesting long-term core funding, or short-term project money. Budgets reflect in a concrete manner the activities that the research organization intends to implement. Thus, budgets are essential to planning, to financial control, and as a means to improve awareness of the scarcity of funds facing the organization.

By completing this study unit, you’ll examine in detail the process by which budgets are prepared. You’ll learn about budget categories and how budgets are organized and presented. We’ll show you an easy method to prepare budgets and track expenditures when the donor agency’s reporting system differs from that of your research organization. You’ll also learn of a quick means to control budgets and critically appraise potential budgetary changes. Finally, we’ll discuss some potential problems that may arise with budgeting.

Good luck with this interesting and practical unit!

The Function of Budgeting

According to a survey of forestry research institutions reported by Gregersen (1984), about 20 to 25 percent of the forest research manager’s time is spent developing and working with budgets for various purposes within their organization. If these institutions are a government agency, they are required to prepare annual budgets as a basis for obtaining annual appropriations. When they submit proposals for funding, whether for individual research studies, major projects, or broad programs, accurate budgets for anticipated expenses must be prepared.
Annual budgeting fulfills several important functions (Arnon 1989):

- Annual budgets are key planning instruments. The budget is the main tool with which research is planned in the short-run and resources are directed into those areas that conform best with research policy and the strategic and program plans. Budgeting requires that concrete decisions be made about the most effective use of scientific, technical, and support personnel, and research facilities and equipment. Managers are compelled to make hard decisions, such as striking an appropriate balance between basic and applied research, long-term and short-term research, and research on various problem areas. Strong guidance on these decisions should be provided in strategic and program planning, but specific monetary values are assigned in the annual budget.

- It is a tool for financial control. Careful budgeting, planning, and periodic review of the status of the budget keep expenditures in line with the approved allocations of financial resources.

- It increases awareness of the scarcity of resources facing the organization, and increases concern over efficient use of resources throughout the organization.

Drucker (1980) suggests that organizations should have two budgets, "...an operational budget for the things that are already being done, and an opportunities budget for proposed new and different ventures." The operations budget is used to manage existing operations. The opportunities budget is developed so that one has a provisional budget ready to take advantage of promising opportunities that are likely to come along. Drucker points out that the operations budget would be much larger and more detailed than the opportunities budget, which would normally be only a few pages. However, a different approach would be used in developing the two budgets.

In developing the operations budget one should ask of each item, "Is this expenditure absolutely necessary?" If the answer is yes, then ask, "What is the minimum expenditure necessary to prevent a serious malfunction?" If the answer to the former question is "No, the expenditure is not absolutely necessary," then ask, "How can we avoid making this expenditure—how can we get out of this?"

In contrast, in developing the opportunities budget, one would ask, "What is the optimum amount of resources that this opportunity could put to productive use?", and "Who is the right person to carry out this work?"

According to Schick (1971), budget systems must serve three functions: planning, management, and control. However, rarely
does any one particular budgeting system work equally well with all of these functions. For example, budgets that are set up to account for and control various categories of expenditures, often are not well adapted to planning or management, where concern is more with relating actual expenditures and accomplishments with planned goals and objectives. In contrast, budgets that are set up to keep track of expenditures by functions or projects may not be well suited to keep track of particular items of expenditures, such as travel or telephone use. Annual budgets for funding a particular research administrative unit may be of little help in planning and evaluating multiyear projects.

In practice, budgets usually try to combine features useful for both management and control, notably through the use of specific expenditure categories within a given organizational unit or project. In that way, total expenditures over time for each individual organizational unit or research projects can be developed, and expenditures for particular items can be documented by aggregating across management units.

**General Approaches to Budgeting**

Two basic approaches to budgeting—incremental budgeting and zero-based budgeting—deserve some discussion because they differ considerably in the way in which they handle budgeting decisions.

**Incremental budgeting** starts with a given level of funding for an organization or program activity, perhaps the level of last year's budget, and is concerned primarily with documenting and evaluating marginal changes in the budget—additions to or subtractions from that budget. It assumes that a base or current level of funding, which has been approved in the past, is acceptable without much further attention or challenge. In determining funding, attention is focused on only those items in the budget that are expected to change, either additions to or subtractions from the budget. The advantage of such an approach to budgeting is that it greatly reduces the amount of detail that must be considered in an annual budget. The disadvantage is that this approach does not easily permit an examination and evaluation of the total program—only changes in that program.

**Zero-based budgeting** evaluates every item in the budget as though it were a new proposal. In essence, it assumes that the current budget level is (or should be) zero, and that each line item in the budget must be justified anew each time the budget is considered for financing. The advantage of such an approach to budgeting is that it enables those who are funding programs and activities to look at the entire package that is being funded, and at all of the components of that package, to determine which items
are worthy of continued funding at this time. The disadvantage of this approach is that it requires a vast amount of data, which requires large investments of time and funds to produce. It also requires large amounts of time and energy to digest, evaluate, and choose among the many alternatives being considered. Although complete zero-based budgeting has proven to be too cumbersome to be widely implemented in practice, some aspects of zero-based budgeting are used by forestry research organizations. For example, in preparing and evaluating research budgets proposed for special or outside funding, one should consider the total costs of the proposed activity, including the cost of the contributions of personnel, time, and facilities provided by the research organization. This would be, in essence, a zero-based budget.

Within each of these two general approaches to budgeting, there are two basic types of budgeting systems that may be used by public organizations (Gordon 1992):

**Object-of-expenditure budgeting** is oriented towards providing fiscal controls over specific categories of expenditures, such as salaries, travel, equipment, to name a few. For example, such budgets would contain allocations for total amounts of funds for salaries, travel, supplies, etc. for the entire organization or research unit, not broken down by research program, project, or study activities. The primary focus is on control of and accountability for various types of expenditures. Some form of object-of-expenditures budgeting is used within almost all budgeting systems. It provides a framework for estimating and accounting for various expense items normally encountered in managing any organizational unit or research project. The drawback to this budgeting approach is that it may provide little information about the costs of specific activities so they can be compared to the expected or realized benefits of those activities.

**Performance budgeting** is directed towards keeping track of expenditures in such a way that the performance of organizational units or project activities can be evaluated. The focus is on providing information for managing various organizational activities. An organization using the more traditional object-of-expenditure system of budgeting for a given research organization as a whole may find it difficult, if not impossible, to determine the actual costs of any one particular research activity that is conducted over a period of years. Performance budgeting is concerned not only with tracking the quantities of various expenditure items used in the performance of work, but also with what was done with those funds. In forestry research, for example, the concern would be with budgeting and accounting for expenditures in such a way that the cost of a given research study could be determined and linked to the anticipated or actual outcomes of that study.
A third type of budgeting, termed Planning, Programming, and Budgeting System (PPBS), was developed by the U.S. Department of Defense in the early 1960s as a means of improving information needed to make funding decisions (Borsting 1982). This is a systematic system of budgeting designed to provide information useful in planning and decisionmaking. It was intended to make programs, not organizational units, the focus of the budget process, and to relate those programs to broad national goals (Gordon 1992). Although PPBS was made mandatory for all U.S. government agencies in 1965, it was never successfully implemented because of political conflict and other factors. Although it proved impractical to implement, PPBS is listed here because it has considerable appeal to planners and analysts, and reference is still made to it in the literature.

The Process of Annual Budgeting

Annual budgeting is a cyclical interactive process. For the purpose of describing the process, however, we can say that budgeting for any one year begins with the director general and other research managers developing initial alternative budget proposals for the relevant fiscal year, usually a year or more in advance. These proposals are based on several factors, including:

- advice received from government budget authorities about what budgetary increases (or decreases) can reasonably be expected. If no such advice is received, the director must develop realistic estimates based on the prevailing financial climate, the level of political support for research, and so on;

- ongoing or assured funding from other sources for specific research projects, activities, or expenditure items;

- the research organization’s goals and needs, determined largely by strategic and program planning, plus unforeseen opportunities and threats that may arise. Budgeting involves hard choices, and a well-thought-out statement of the organization’s mission and goals can help guide those choices;

- the existing budget and allocation of resources across programs and projects. The immediate program is determined to a large extent by work already in progress, so changes associated with preparing alternative budget proposals are often confined to changes at the margin rather than drastic reallocations (Goldsworthy 1987); and

- proposals for new research initiatives developed by team leaders and researchers or suggested by external stakeholders. New research programs, projects, or major new studies within an existing project must be budgeted. Ideally, this process works
from the smallest units of research upwards, with researchers or team leaders preparing detailed estimates of budget requirements for each proposal (Amon 1989). Managers and a technical review team then select the most important proposals for inclusion in one or more of the alternative budget proposals.

As these five factors indicate, the process of developing alternative annual budget proposals should be both a top-down and a bottom-up process, similar to program planning (Study Unit 5.2). Budget advice from higher authorities and the organization's strategic and program plans are the main sources of top-down input, and the current budget and research proposals for new projects and studies are the main sources of bottom-up input.

Early in the process of developing a budget, whether for the entire organization or for individual research proposals, research managers should work closely with personnel from the budget and finance administrative division of the organization. Since they are the people who will administer the budget and account for expenditures, their advice and assistance in developing an appropriate workable budget can be essential. Also, their experience and advice can help avoid making costly mistakes.

Based on these factors, the formal budget request is then developed and submitted, and budget negotiations with the ministry begin. The formal budget request should contain proposals for adjusting the research program in the event that resources are greater or less than anticipated (Goldsworthy 1987). In the budget negotiation process, adjustments to the proposed budget are often required. Eventually, the budget proposed for forestry research becomes a part (a very small part) of the overall budget of the government. This budget is then acted upon, and modified, in the legislative appropriation process. Eventually, the funds are appropriated and made available to the research organization after passing through administrative channels. Once the research organization receives an allocation of funds for the designated fiscal year it in turn allocates funds to programs and research projects according to the annual plans, adjusted as needed to correspond to the actual amounts appropriated.

Research managers should not attempt to micromanage the budget, or take on duties more appropriate for budget and finance personnel. Managers should instead manage the budget, insisting on frequent expenditure reports, and ensuring that spending for research activities proceeds according to plan.

Periodic financial reviews of research projects and the entire organization should be held throughout the year to review status and make adjustments as needed. A budget monitoring process should provide managers with up-to-date information on money spent, and managers also receive regular intervals. It should be a routine process of reviewing the budget.

Budget Fundamentals

It is difficult to accurately and efficiently report expenditures. Every project in any form of organization has a budget. For example, building a building that includes both cooling, heating, many other short-term projects, and a small amount of funds. In preparing budgets, every project is done in the budget, and the expenditure projects are managed by every expense. Every detailed plan must be accurate, and the general plan should be reviewed for a report. Examples of such plans are:

- Salary and benefits, including both part-time and full-time employees
- fringe benefits
- travel and such similar costs
spent, materials used, etc., in a usable form. This should provide managers with information they need to make informed decisions regarding program and project management. Team leaders should also receive budget reports for their individual projects at regular intervals, so they can monitor expenditures and budget balances.

It should be noted that managers are always concerned with several annual budgets at any one time: developing budgets for future fiscal years, administering the current budget, and reviewing, reconciling, and reporting on previous budgets.

Budget Formats
It is difficult to suggest any formal outline for research budgets. Every public and private organization has its own particular system of setting up accounts to meet its needs. In preparing and reporting on budgets, each research manager must follow the format prescribed for the organization. Budget categories vary greatly depending upon the type of organizational unit involved. For example, a forestry research organization, with many buildings and facilities, might have a detailed and complex budget that includes facility maintenance, electrical services, heating or cooling, research support services, administrative services, among many other things. In contrast, a budget prepared for a small short-term research study may be relatively simple, with only a small amount of operating funds.

In preparing budgets for proposed research programs, projects, studies, or other activities, it is essential that a thorough job be done in anticipating and allowing for all categories of expenditures. The failure to anticipate expenses on research projects can lead to headaches and nightmares for research managers and administrators. Research managers should make every effort to ensure that those who prepare budgets follow detailed guidelines regarding categories of expenditures that must be accounted for in any planned project. Although it is difficult to generalize, it can be said that the following types of expenditures should be considered, one way or another, in developing a budget for a research program, project, or study:

- **Salaries and wages**—may be broken down into various categories of employees (research scientists, technical support, clerical assistance, etc.) or types of employment (permanent full-time, temporary part-time, etc.).
- **Fringe benefits**—includes retirement benefits, health benefits, etc.
- **Travel and transport**—may be broken down into categories such as domestic and international, etc.
• **Equipment**—includes purchase, repairs, maintenance; equipment items may be itemized, and a statement made as to disposition of the equipment once the project is terminated.

• **Supplies and materials**—this may be a general estimate, or special supplies required on the project may be itemized, depending upon the situation.

• **General office expenses**—includes cost estimates for telephone, fax, mail, photocopying, etc.

• **Utilities**—there may be a general overhead charge for utilities (electricity, water, etc.), or special charges for providing special utility services required by the research.

• **Contracts**—includes contracts and payments for services with outside individuals, firms, organizations.

• **Maintenance of Facilities**—this may be a separate charge, or it may be included in a general overhead charge to cover janitorial services and general maintenance of the buildings and facilities occupied and utilized by the program or project, etc.

• **Construction**—this would include detailed cost estimates of facilities to be constructed for the project.

• **Technology transfer**—includes costs of preparing, publishing, and distributing publications and other materials to intended audiences, and for other technology transfer activities.

• **Contingencies**—generally a small percentage (perhaps 5 percent) of project expenses as a reserve to cover unanticipated expenses, including items overlooked and cost overruns.

• **Hospitality allowance**—some forestry research organizations explicitly recognize the need for a small fund to cover the cost of providing refreshments and extend hospitality to clients and other visitors, and are able to include this as a specific budget item. In other organizations, because of particular rules or regulations, these costs may have to be funded by outside donations or in other ways.

• **Administrative (overhead) expenses**—an important element of the budget, frequently overlooked by research scientists in developing a research budget, are the expenses an organization incurs in administering a research program—sometimes called overhead expenses. Sometimes these are stated as a fixed percentage of the operating budget. In some cases, administrative charges are flexible, and may even be waived. Those preparing program, project, or study budgets should be aware of the need to allow for administrative expenses, and should consult with administrative personnel to determine if this
charge is needed, and if so, how it should be estimated. This is particularly important in developing budgets involving outside funding, because such expenses can be substantial for new and expanded programs and other research activities. Often, this expense item is subject to special negotiation separate from negotiation over the operating budget.

Not all of these items may be applicable to any one particular activity or organization. For example, for a research study, it may be necessary only to be concerned with providing special operating funds, but not with salaries.

Each forestry research organization will, of course, have its own special budget categories, usually specified by higher administrative levels, that differ from the general categories given above. Box 7.3.1 provides an example of the major budget categories used by the Papua New Guinea National Forest Authority for Forest Research Services.

Box 7.3.1. Major budget categories used by the Papua New Guinea National Forest Authority for forest research services.

- 111 Salaries and Allowances
- 112 Wages
- 113 Overtime
- 114 Leave Fares
- 121 Travel and Subsistence Expenses
- 122 Utilities
- 123 Office Materials and Supplies
- 124 Operational Materials and Supplies
- 125 Transport and Fuel
- 127 Rental of Property
- 128 Routine Maintenance Expenses
- 135 Other Operational Expenses
- 141 Retirement Benefits, Pensions, Gratuities and Retrenchment
- 142 Membership Fees and Contributions
- 221 Office Furniture and Equipment
- 225 Construction, Renovation and Improvement

Source: Personal communication from Dr. P. Srivastava, former Director, Papua New Guinea Forest Research Institute, December 1993.

Generally, the amount of detail and particular categories of expenditures required depends upon the nature of the project and the requirements of the funding organization and the research organization. In some cases it may be necessary to develop precise estimates of each budget item. In many cases approximations of costs are adequate. The ability to develop precise estimates may be affected by the size and length of the project.
project (it may be more difficult to obtain precise estimates of expenses on lengthy projects), and the nature of the expenditures (some expenses may be easier to estimate than others). It also may not be as necessary to develop precise estimates of each budget item if the funding agency or organization allows some flexibility in transferring funds among budget items.

When the initial budget is developed by research scientists or others who are not familiar with financial management procedures, the experienced manager checks to ensure that all relevant budget categories are accounted for, and that the amounts budgeted appear to be reasonable estimates on the basis of personal experience. Everything always seems to take longer and cost more than we anticipate. Some allowance should be made for the almost universal tendency to underestimate the time and costs of completing proposed research activities. Some allowance in the budget to cover contingencies—unexpected happenings—is almost always required.

Problems with Conflicting Budgeting Systems

A difficulty arises when outside funding is sought and you, as a research manager, are required to prepare budgets not only in the format of the granting organization or agency, but also in the format of your own organization. A manager is usually required to follow internal budgeting and financing procedures and guidelines in developing budgets. At times, a granting organization may be willing to accept your organization’s budget categories, even though it suggests a different format. However, at times the grantor insists for its own internal accounting procedures that budget expenditure reports be prepared in a format that differs from the FRO’s format. In such cases, it may be necessary to prepare a budget for each of the two budget systems, and to report expenditures in both formats simultaneously. For doing this, a matrix table format is useful. To illustrate this procedure, a simple hypothetical example of a project to host a research conference will be used (box 7.3.2).

By setting up a matrix table, using both sets of budget categories, one can develop a useful tool for keeping track of project expenditures that will satisfy both organizations (see table 7.3.1). In this example, the budget categories of your research organization are shown as column headings across the top. The budget categories of the funding organization are shown at the far left side, heading each row in the table. The budget items according to the categories used by the research organization are given in the bottom row of the table (see the original budget in Box 7.3.2). Each budget item then has to be distributed within the
Box 7.3.2. Proposed project to host a research conference.

Funding is being sought to host a research conference that will include a number of international participants. Some of these participants will be presenting papers, for which a modest honorarium is being paid. Travel expenses for those participants will be covered. A proceedings of the conference will be published. Funding will be needed to cover the salaries of those organizing the conference and preparing the proceedings (the principal investigators of this conference project), and to provide clerical assistance before, during, and after the conference. You estimate, using the budget categories required by your organization, that the following funds will be required for the conference:

A. Salaries of Principal Investigators (includes fringe benefits)
   - Dr. XYZ: $5,000 + $1,000 fringe benefits
   - Mr. ZZZ: $4,000 + $800 fringe benefits

B. Clerical salaries (includes fringe benefits)
   - $2,000 + $300 fringe benefits: $2,300

C. Contracts (rental of meeting room, honoraria)
   - $4,500

D. International travel of participants
   - $8,000

E. Domestic travel
   - Participants: $2,000; staff: $2,000

F. Office expenses
   - $3,000

TOTAL BUDGET $32,600

Unfortunately, the potential funding organization does not accept these budget categories, and requires that you submit your budget, and report on expenditures, using the following categories:

1. Total Salaries
2. Fringe Benefits
3. Conference (includes meeting and participant travel expenses)
4. Publication of proceedings
5. Other Travel
6. Telephone & Fax
7. Postage
8. Office and other Supplies
Table 7.3.1. Hypothetical set of budgets for a research organization and a funding organization for a project to fund an international research conference, to illustrate a matrix approach when budget categories differ between funding and requesting organization.

<table>
<thead>
<tr>
<th>Budget Categories of Funding Organization</th>
<th>A. Salaries of Principal Investigators</th>
<th>B. Clerical salaries</th>
<th>C. Contracts (room rental, honoraria)</th>
<th>D. International travel</th>
<th>E. Domestic travel</th>
<th>F. Office expenses</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Total salaries</td>
<td>$9,000</td>
<td>$2,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$11,000</td>
</tr>
<tr>
<td>2. Fringe benefits</td>
<td>$1,800</td>
<td>$300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$2,100</td>
</tr>
<tr>
<td>3. Conference expenses</td>
<td></td>
<td></td>
<td>$4,500</td>
<td>$8,000</td>
<td>$2,000</td>
<td></td>
<td>$14,500</td>
</tr>
<tr>
<td>4. Publication of proceedings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$2,200</td>
<td>$2,200</td>
</tr>
<tr>
<td>5. Other travel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$2,000</td>
<td></td>
<td>$2,000</td>
</tr>
<tr>
<td>6. Telephone, fax</td>
<td></td>
<td></td>
<td></td>
<td>$400</td>
<td></td>
<td>$400</td>
<td></td>
</tr>
<tr>
<td>7. Postage</td>
<td></td>
<td></td>
<td></td>
<td>$200</td>
<td></td>
<td>$200</td>
<td></td>
</tr>
<tr>
<td>8. Office and other supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$200</td>
<td></td>
<td>$200</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$10,800</strong></td>
<td><strong>$2,300</strong></td>
<td><strong>$4,500</strong></td>
<td><strong>$8,000</strong></td>
<td><strong>$3,000</strong></td>
<td><strong>$32,600</strong></td>
<td></td>
</tr>
</tbody>
</table>

For example, budget category A. Salaries of Principal Investigators was $10,800, including a base salary of $9,000 and fringe benefits of $1,800. These items are entered in the appropriate box, under column A opposite the budget categories of 1. Total Salaries and 2. Fringe Benefits. Similarly, the budgeted amount for clerical salaries is distributed between total salaries and fringe benefits, domestic travel is divided into domestic travel for conference attendees and travel of staff (other travel), and office expenses are shown for the categories prescribed by the funding organization. Then the items in each row are totaled and entered in the far right column. These, then, become the breakdown of budget items to be submitted to the funding agency. They should, of course, total the same as the budget items for the research organization. The only difference is that they are broken down into different categories. The boxes inside the table with funding amounts shown then become the budget categories for which expenses must be kept. This may require some extra bookkeeping on the part of your organization, so that expenditures can be reported as required by the funding agency. Expenditures for each of those boxes can be summarized at appropriate intervals, and compared with budgeted amounts. Those
Expenditures can be totaled both by rows and by columns for reporting purposes to the research organization and the funding organization.

**Controlling Budgets**

When funding is tight, and must be carefully controlled, there is a need for organizations to systematically analyze older programs to determine if they are still serving their function, and to abandon those that have become unproductive or are obsolete. When resources are scarce, one way to control expenditures in developing a budget is to require that every new proposal for funding expenditures by a unit of the organization be accompanied by a proposed reduction of existing programs equal to the new proposed expenditure (Drucker 1980). If a person asks for additional funds, you ask them, “Then what do you propose to give up in exchange for the new funding?” In essence, this mode of budgeting assumes that in any organizational unit there is a mix of programs and activities, some of which are more productive than others. The presumption is that any new activity or program that is proposed must be better in some sense than some of the existing programs. If that is so, then why not substitute this new productive program for one that is less productive or useful. If the proposed program is not better than existing programs, why would one want to fund it?

In considering any program changes, the following set of questions have been found to be useful:

- What are we doing now that we should continue to do?
- What are we doing now that we should stop doing?
- What are we not doing now that we should start doing?

**Additional Problems With Annual Budgeting**

Having to plan and budget research on an annual basis has serious shortcomings because of the long-term nature of research. Fluctuations in funding from year to year can destroy the effectiveness of the budget as a tool for planning. A productive research program requires continuity and stability of funding over several years, at a minimum. The productivity and morale of researchers will suffer greatly if projects are abruptly cut or terminated due to fluctuations in annual funding. Stability of funding from year to year is a major concern in many forestry research organizations in developing countries (Bengston and Gregersen 1988). Despite the problems with annual budgeting of multiyear research activities, annual budgets approved by legislatures or other government authorities are required in most
countries. While annual appropriations are the rule, an unofficial commitment of management support for individual projects and studies over their planned duration should be given whenever possible.

The use of the budget as a planning instrument is also often limited by a relatively large proportion of the budget being allocated to fixed costs, especially salaries, and by the need to maintain a minimum of activity in each program area. Inadequate operational funding relative to funding for salaries is a widespread problem, resulting in inadequate travel funds, maintenance of equipment, fuel for vehicles, and many other items needed for research. In some agricultural research institutions, up to 90 percent of the total budget is spent on salaries (Elz 1984). An FAO (1984) survey of forestry research institutions in Africa found that inadequate operational funds—as indicated by operational funding falling below 100 percent of personnel costs—was a serious problem for the majority of countries. Managers need to carefully balance the amount of money committed to relatively permanent salaries against the need for operating funds to make effective use of the people who are available to do the work. Without adequate funds to support their research, research scientists will be unable to make effective use of their capabilities.

Funding that is designated for or tied to particular research projects or activities can further restrict the manager’s flexibility to carry out strategic and program plans. Before accepting such funding, managers should recognize the constraints this may put on carrying out the strategic plan and reaching the goals and objectives of the organization.

Another problem commonly encountered is that the budget categories used for fiscal accountability and reporting often are not well-suited for project management. Thus, records kept for fiscal reporting and financial control may not be very helpful in meeting information needs for personnel management, monitoring and evaluation, etc. In such cases it may be necessary to prepare a budget with the categories you need to manage the project, and keep rough unofficial records of receipts and expenditures by these categories, and compare these periodically against your budgeted items. Unfortunately, the keeping of such records is often frowned upon (if not expressly forbidden), even though the official records do not meet the needs of research management.

An additional problem for research administrators can arise when some funds or legislative appropriations are designated for specific categories of expenditures in particular locations, or when specific expenditures are forbidden or severely constrained. Often such funding restrictions are based primarily on political considerations,
and may bear little relationship to the organization's strategic plan or program plan. Such designated or restricted funding can greatly reduce the manager's flexibility to allocate funds among research programs. For example, funding for the construction of a new research facility, such as a field laboratory, in a specific location may not include adequate funding now or in the future to staff, operate, and maintain the facility. If additional funding is not available, then existing funds (and/or personnel and equipment) may have to be reallocated from existing research programs in order to meet the new demands for resources. Managers may be able to make these problems known to higher administrative levels, but may be able to do little to correct the situation.

A major consideration in annual planning and budgeting is the timing of funding. This can be a particular problem with outside funding that is provided in relatively equal increments, on perhaps a semi-annual or quarterly basis, but where expenditure needs vary substantially over time. Funding must be available to cover expenses when they are incurred. If a research project requires a sizeable amount of funds to pay for initial activities, perhaps the installation of experiments, or purchase of expensive equipment, then the budget should reflect that need and insure that the funds will be available when needed. Serious problems can arise if the flow of funds is not well-matched to the pattern of expenditures. In preparing budgets and planning expenditures, managers should compare flows of expected incomes and expenditures, and compensate for any potential deficiencies by requesting a change in the pattern of income flows, and/or changing the pattern of expenditures.

In estimating expenses and preparing budgets for work to be carried out in the future, one cannot rely solely on today's costs. Allowance must be made for future increases in salaries and other costs, inflation, changes in exchange rates (where applicable), and other changes that will affect costs (Austin 1990). Cost estimates must be based on the timing of project expenses, particularly if the rate of change is rapid. A delay of even a year in funding or implementation can make substantial changes in funding needs. If there are delays, budgets may have to be changed and renegotiated to reflect changed costs.

There is a particular need to develop a strategy for dealing with the problems brought about by unexpected changes in funding. Because of political or other events, a manager may be faced with unanticipated cutbacks in funding partway through a fiscal year. Salaries or medical insurance, or retirement benefits may be increased partway through the fiscal year, or worse, made retroactive to an earlier date. Conversely, the manager may be told that unexpected extra funds are available a short time before the
end of the fiscal year, and must be spent within a relatively short period of time. In either case, the manager should be prepared to adjust research programs, projects, and other activities to meet the challenges brought by such changes in funding. For example, one strategy to deal with unexpected increases in funding is to have some research project proposals at least partially prepared in advance and “sitting on the shelf,” so that when funding opportunities arise you are in a position to quickly take advantage of them.

Finally, excessive budgetary regulations and control may result in a heavy burden on researchers and team leaders: “It appears that a concern for fiscal responsibility has often been carried to the point where it becomes an excessive burden on research productivity” (Ruttan 1981). Arnon (1989) notes that professional support for financial management is often inadequate, resulting in the inflexible application of budget control and related problems. Managers may want to consider delegating more expenditure authority (if permitted by law) to subordinates who have demonstrated a capacity and ability to manage funds responsibly and, where possible, relaxing reporting requirements.
When considering program changes that require changes in budgeting, what three questions should research managers ask prior to approving or implementing the changes? Write them in spaces provided below.

1.

2.

3.

You have been asked to prepare a budget for a special study which examines the use of native plant communities as predictors of soil/site characteristics. What general expenditure categories would you include in this budget? List them in the space provided below.

1.

2.

3.

4.

How would these expenditure categories change if you were developing an annual budget for your entire research organization?
Three (3) questions that research managers should ask prior to approving new research programs or implementing changes in budgets are:

1. What are we doing now that we should continue to do?
2. What are we doing now that we should stop doing?
3. What are we not doing now that we should start doing?

General expenditure categories to be included in a study budget might include:

1. Salaries and wages
2. Fringe benefits
3. Travel and transport
4. Equipment
5. Supplies and materials
6. General office expenses
7. Contracts
8. Technology transfer

For annual budgets that include all activities of the research organization, you might want to include other categories, such as:

- Utilities
- Maintenance of Facilities
- Construction
Two general approaches to budgeting, and two basic types of budgeting, commonly used by public organizations were described in the text. Please list these in the space below, briefly describe each and list their advantages and disadvantages.

General approaches to budgeting:
1. 

Basic types of budgeting:
1. 

2. 
The two general approaches to budgeting include:

1. **Incremental budgeting**—builds on previous budgets and documents marginal changes in the budget. The advantage of incremental budgeting is that it greatly reduces the amount of detail that must be considered in an annual budget. The disadvantage is that this approach does not easily permit an examination and evaluation of the total program, only changes in that program.

2. **Zero-based budgeting**—the budget includes all items, and requires justification for each expenditure item. The advantage of zero-based budgeting is that it enables funders to look at the entire package that is being funded, and at all of the components of that package, to determine which of the items should be funded at this time. Its disadvantage is that it requires a large amount of data, which require considerable time and funds to produce. It also requires much time and energy to evaluate and decide among the many funding alternatives.

The two basic types of budgeting include:

1. **Object-of-expenditure budgeting**—in which expenditures are classified by type of expenditure. The advantage of this type of budgeting is that it helps managers and administrators keep track of and control specific categories of expenditures. Its disadvantage is that it may provide little information for attributing costs and benefits to specific activities.

2. **Performance budgeting**—in which expenditures are linked to outcomes. This helps the manager measure organizational and individual performance. The disadvantage of performance budgeting is that it may not provide the detailed information needed to control particular types of expenditures.
Carefully read the following budget description and answer the question that follows.

**Activity 4**

**Situation Analyses**

Funding is being sought to implement a series of studies that examine the economic potential of a number of products derived from intact, native tropical forests. This is part of a larger program of research examining the workability of the concept of extractive reserves as an alternative to achieve sustainable forest use. You estimate the studies will require two scientists and a technician two years to complete on a part-time (50%) basis. Your organization's current funding levels are not sufficient to fund this work, thus, you are obliged to seek funds from external sources.

Using the budget categories required by your own organization, you estimate that the following funds will be required annually to implement these studies. This format will be required for reporting to your organization, should funding be received.

A. Researcher Salaries
   - Dr. ABC: $15,000 + 1,000 fringe benefits/year
   - Dr. LMN: $10,000 + 800 fringe benefits/year
   - Technician: $2,000 + 200 fringe benefits/year

B. Clerical Salaries: $3,000 + 300 fringe benefits/year

C. Contracts (forest product collection, equipment rentals, laboratory fees): $5,000

D. Materials/Equipment: $6,000

E. Supplies (nonoffice): $2,000

F. International Travel (2 senior scientists to 1 conference/yr): $8,000

G. Domestic Travel: $4,000

H. Publication/Research Results Dissemination: $2,500

I. Office Expenses/Miscellaneous expenses: $3,000

**Total Annual Budget**: $62,800

**Total Funding Request (2 years)**: $125,600
Unfortunately, the potential funding organization does not accept these budget categories, and requires that you submit your budget, and report your expenditures, using the following categories:

1. Total salaries
2. Fringe benefits
3. Materials expense (include contractual, materials, equipment, and supplies)
4. Publication/dissemination expenses
5. Travel
6. Telephone and fax
7. Postage
8. Office and supplies

Use the matrix table on the next page to include both budget reporting formats. Fill in the budget categories and enter the appropriate dollar figure in the corresponding cell in the matrix.
<table>
<thead>
<tr>
<th>Budget Categories of Funding Organization</th>
<th>A. Researcher Salaries</th>
<th>B. Clerical Salaries</th>
<th>C. Contracts</th>
<th>D. Materials &amp; Equipment</th>
<th>E. Supplies (nonoffice)</th>
<th>F. International Travel</th>
<th>G. Domestic Travel</th>
<th>H. Publication Expense</th>
<th>I. Office &amp; Misc. Exp.</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>TOTAL</td>
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<td></td>
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</tr>
</tbody>
</table>
This matrix records expenditures and presents budget information when the budget categories differ between the funding agency and the requesting organization.

<table>
<thead>
<tr>
<th>Budget Categories of Funding Organization</th>
<th>A. Researcher Salaries</th>
<th>B. Clerical Salaries</th>
<th>C. Contracts</th>
<th>D. Materials &amp; Equipment</th>
<th>E. Supplies (nonoffice)</th>
<th>F. International Travel</th>
<th>G. Domestic Travel</th>
<th>H. Publication Expense</th>
<th>I. Office &amp; Misc. Exp.</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total salaries</td>
<td>$ 27,000</td>
<td>$ 3,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 30,000</td>
</tr>
<tr>
<td>Fringe benefits</td>
<td>$ 2,000</td>
<td>$ 300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 2,300</td>
</tr>
<tr>
<td>Materials</td>
<td></td>
<td></td>
<td>$ 5,000</td>
<td>$ 6,000</td>
<td>$ 2,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 13,000</td>
</tr>
<tr>
<td>Publication</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 2,500</td>
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<td>$ 2,500</td>
</tr>
<tr>
<td>Travel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 8,000</td>
<td>$ 4,000</td>
<td></td>
<td></td>
<td>$ 12,000</td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 1,200</td>
<td></td>
<td>$ 1,200</td>
</tr>
<tr>
<td>Postage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 300</td>
<td></td>
<td>$ 300</td>
</tr>
<tr>
<td>Office and supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 1,500</td>
<td></td>
<td>$ 1,500</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$ 29,000</strong></td>
<td><strong>$ 3,300</strong></td>
<td><strong>$ 5,000</strong></td>
<td><strong>$ 6,000</strong></td>
<td><strong>$ 2,000</strong></td>
<td><strong>$ 8,000</strong></td>
<td><strong>$ 4,000</strong></td>
<td><strong>$ 2,500</strong></td>
<td><strong>$ 3,000</strong></td>
<td><strong>$ 62,800</strong></td>
</tr>
</tbody>
</table>

It is important to note that the total sum found in the lower right corner of the matrix must be exactly the same whether one adds across the base of the matrix, or down the right side. If the sum of these subtotals do not agree, then budget amounts either have not been included, or were entered incorrectly.
Budgets and budgeting are an essential and inevitable part of forestry research management. Research managers spend up to 40 percent of their time preparing, defending, and managing their organization's budgets. Thus, sharpening your budgeting and financial management skills is essential to your administrative performance and that of your organization.

Budgets specifically reflect the organization's research and other activities it intends to implement. Thus, budgets are essential to planning, to financial control, and as a means to improve awareness of the scarcity of funds facing the organization.

In this study unit, you examined the process by which budgets are prepared. You also learned about budget categories and how budgets are organized and presented. We showed you an easy method to prepare budgets and track expenditures when the donor agency's reporting system differs from that of your research organization. And we gave you some tips on how to control budgets, to critically appraise potential budgetary changes, and to be aware of some potential problems that may arise with budgeting and financial management.

If you would like more information regarding budget preparation, we encourage you to obtain and review the interesting articles in the literature cited and other references listed at the end of the module. A key article directly related to the topics covered in the module, and cited in the text, is reprinted for your use in the section on readings at the end of the module.
Objectives

When you have completed this study unit you should be better able to:

• understand the importance of closely monitoring expenditures in managing accountability in the use of research funds;
• recognize the need for and importance of periodically reconciling planned (budgeted) and actual expenditures; and
• discuss the advantages and disadvantages of delegating expenditure authority.
Objectives

When you have completed this study unit you should be better able to:

- understand the importance of closely monitoring expenditures in managing accountability in the use of research funds;
- recognize the need for and importance of periodically reconciling planned (budgeted) and actual expenditures; and
- discuss the advantages and disadvantages of delegating expenditure authority.

Managing Funds

One of the most critical jobs of the research manager is managing the flow of funds that are needed to support ongoing and planned research activities. To do this effectively, the manager must keep close track of all expenditures and obligations for future expenditures to ensure that they are in line with budgeted amounts and available funds.

This study unit addresses this research management problem. In this study unit, you'll review the need for and importance of accounting for the expenditure of research funds entrusted to the research manager. You'll learn about the importance of periodically reconciling the differences between the amounts of funds budgeted and the amounts actually spent on research activities. Finally, you'll learn about some of the advantages and disadvantages of delegating authority for expenditures. We hope that you'll find some useful management tips in this short study unit.

Managing Funds: A Key Responsibility of Management

The planning, budgeting, authorizing, and overseeing expenditures of funds is a key part of management. Although many of the day-to-day tasks of keeping financial records can be delegated to qualified assistants, the ultimate responsibility for the handling of funds rests with the manager. Regardless of how distasteful it may be to some managers, they must become financial managers. They cannot evade the responsibility for managing the funds at their disposal. An evaluation of their performance as a manager will be strongly influenced by the way in which they discharge their responsibilities in this area.

Managing Accountability

Managers of research projects are held accountable for the way in which funds allocated to their unit are expended. They must be aware of the legal
limits and constraints that surround expenditures of public funds. The diversion of funds from one project to another to cover unanticipated expenses may in some cases be allowed, and in other cases forbidden. If illegal diversions occur they could be subject to criminal penalties. It behooves the manager to not only keep close track of all reported expenditures to ensure that they are charged to the proper accounts, but also make sure that the expenditures reported accurately match actual expenditures.

Managers need to closely monitor research expenditures to ensure that they follow legal guidelines, are appropriate for the planned activities, and do not exceed budgeted amounts. In carrying out this financial management responsibility, the manager often is hampered and frustrated by the lack of timely and useful information on the current status of receipts and expenditures. In many cases, categories of expenditures are dictated more by the administrative reporting needs of the organization or the government as a whole, than by the management needs of the research manager. Individual expenditures within a given category may be lumped together, regardless of the research activity for which they were incurred, and reported only as totals, without specific identification of origin. It may be difficult, if not impossible, to keep close track of expenditures using official records and reports.

When there is a need to keep more detailed records than the formal recording system allows, it may become necessary to keep informal records of one's own in order to keep better track of incomes and expenditures. Managers will sometimes find it necessary to keep such records, because they are held accountable for managing the funds entrusted to them, but are not given through official channels the information they need to carry out that responsibility. However, managers of larger organizations with accounting staff should avoid the temptation of micromanaging the accounts, and questioning every expenditure item. The manager's job is to oversee the accounts, not to do the accounting themselves. To keep on top of this job, they should meet regularly with accounting personnel to review the broad schedule of balances and spending rates in the various accounts. This is a good time to discuss any potential problems that may be emerging, such as overspending in particular accounts or dealing with an impending cutback in funding levels, and develop plans for resolving problems before they reach crisis proportions.

**The Role of Auditing**

All governmental organizations are subject to some form of external auditing of income and expenditure accounts. How auditing is done, the frequency with which it is done, and the
organizational responsibility for doing it will vary from country to country. However, the basic reason for auditing remains the same—to compare planned expenditures with actual expenditures, check on compliance with existing laws and regulations relating to incomes and expenditures, and detect possible fiscal irregularities in the handling of funds. Larger forestry research organizations rarely rely upon external auditing for all of their auditing. Because managers know they will be subject to an external auditing and accounting for expenditures of funds, they want to ensure that their accounting practices will stand such scrutiny. To do this they may maintain their own internal auditing department to conduct audits on a regular basis, or hire reputable private firms to carry out this task. Overseeing this auditing function to ensure fiscal integrity is an important part of management.

Reconciling Budgets and Expenditures
In planning research projects funding requirements often must be estimated well in advance of the work and before firm cost estimates can be obtained. Later, when the actual work is done, there may be substantial differences between budgeted and actual costs. Estimates of research costs developed as part of project proposals and project study plans are notoriously unreliable. There seems to be a universal tendency among all organizations to underestimate the amount of funding that will be required to complete a planned piece of work. As the work progresses, it is discovered that despite careful planning the outputs expected from the research cannot be produced on time because of unforeseen delays. Too often the manager is faced with the need to make some difficult decisions: Should we terminate the work after all funding is exhausted, even if the outputs are incomplete? Should we continue to work to complete the outputs as planned, regardless of the additional costs? If so, where will the funding to cover these additional expenses come from? Sometimes the planned work is flexible, and there is little problem with continuing work on a project until it is completed. Occasionally it is possible to renegotiate contracts with funding agencies to supplement and/or extend the grant to allow for completion. However, in some cases no additional funds are available to cover additional work, and the research will have to be halted before completion. This can reflect poorly on the accomplishment record of the organization, and should be avoided wherever possible.

Managers must be aware of these discrepancies between budgeted amounts and actual expenditures, and take steps to resolve the differences. It may be possible to secure permission to reallocate funds among budgeted items, or to redesign planned work to better fit the existing budget. Most funding agencies recognize the need
for some degree of flexibility in keeping within budgeted amounts, but in some circumstances the laws and regulations governing this may be very strict and inflexible.

Every manager fears the catastrophic situation of a particular project running out of money because the next allotment due from the funder has not yet arrived. Sometimes the reason for the lateness lies with inefficiencies of the funding organization. More often, however, funds are withheld because the research organization does not submit the proper documentation or reports on time, or because the funding organization has serious concerns about the way the research organization is administering the funds.

Thus, in order to achieve smooth interorganization coordination, each organization must meet all deadlines for reporting and documentation. Further, close and constant communication is required to smooth over minor differences and clarify misconceptions, with a primary goal being the avoidance of funding problems and delays.

The astute manager recognizes that regardless of what amounts are budgeted for a research activity, what really counts is the amount of money that is available when it is needed to cover expenses that have been incurred. The flow of funds, or authority to expend funds, to the research organization must be synchronized with the rate at which expenditures are incurred. Forestry research organizations often have several sources of funds. Each of these funds should be managed as though it were a separate account. To be financially accountable for these separate funds, it is necessary to keep track of incomes and expenditures for each fund by itself. Funds provided to finance one particular research project should not be diverted, even temporarily, to fund other projects that may be temporarily short of funds due to the failure of funds to arrive when expected. The mixing and pooling of funds from various sources can lead to serious organizational and personal problems, and should be avoided. Managers must remain fully informed about the status of current and expected inflows and outflows of funds from established accounts, so that they can anticipate and take steps to avoid potential shortfalls. The key word here is *anticipate*. The manager must be able to recognize emerging problems far enough in advance to take effective action, perhaps by alerting funding agencies of the need for accelerated payments, rescheduling of lower priority work, purchasing, contracting, or other activities that involve outlays of funds. In some cases this may involve some serious and difficult decisions, such as canceling scheduled activities, terminating research projects, and reducing hours of personnel or terminating employment.
Field office managers should maintain their own records so they can more closely monitor expenditures. Such records often can provide a more up-to-date reconciling of accounts than can be provided by central accounting offices. It also can serve as a useful check on central accounting records, and as a basis for resolving any apparent discrepancies in the accounts.

In developing study plans and annual budgets, research managers prepare estimates of expenditures by various budget categories. Once the research project or program is approved, and funding is provided for each approved category of expenditures, then the manager knows how much funding is available for each expenditure category, and can plan for that expenditure. However, the manager cannot assume that actual expenditures will take place as planned. Unexpected delays, changes in personnel assignments and/or pay rates, changes in costs of equipment, materials, supplies, and services, all may change the anticipated pattern of expenditures. As work progresses, managers find it necessary to continually reassess the financial balance sheet of the research programs for which they are responsible. They may be forced to rebudget and readjust expenditures for particular research activities throughout the year or research period as new information on funding balances becomes available. It is well to do this frequently, so as to detect early warning signs of any problems before budgets and expenditures become too far out of line.

### Delegating Spending Authority

*Delegating responsibility without the authority and resources needed to carry out that responsibility is irresponsible!*

Because research managers have the responsibility for keeping expenditures within budgeted amounts, they would like to have as much control as possible over project spending. For this reason, they tend to favor centralized control of spending. Some may insist that all expenditures require their personal approval and authorization, or that of a specially designated administrative officer within the organization. They may favor centralized purchasing of all supplies, equipment, and other goods and services. Although centralization provides the manager with a greater sense of control over expenditures, in many cases it can create bottlenecks in carrying out research projects, and result in the purchase of supplies, equipment, and services that do not fully meet the needs of those doing the work.

Delegation of spending authority to subordinates who have demonstrated that they can be trusted to expend funds wisely in
carrying out their research responsibilities can have several positive benefits:

- Those who are closer to the work being performed usually are in a better position to ensure that the supplies, equipment, and services purchased for that work will actually meet their needs.

- If responsibility has been assigned to a person, then delegating to that person the authority necessary to carry out those responsibilities should improve organizational performance.

- With adequate authority, subordinates can develop their managerial capabilities, and relieve the manager of some of the more routine recordkeeping and reporting requirements.

- Delegation of authority can be an official recognition of achievement and status in the organization, and be looked upon as a reward for excellent performance.

There are disadvantages to delegation as well:

- In delegating spending authority, managers will suffer some loss of control over expenditures.

- Delegation of authority may result in inefficient expenditures, due to the lack of familiarity of alternative sources and prices for goods and services.

- Economies of scale in purchasing large amounts of commonly used supplies might be lost.

- Delegation of authority can be misused. Unfamiliarity with purchasing regulations and other legal requirements related to expenditures of government funds can lead to unintended misuse of funds or, in the worst case, to deliberate diversion of funds from their intended purpose.

The delegation of authority to subordinates is a serious step for managers. It is not to be undertaken lightly. However, when it is undertaken, the delegation should be clear and unambiguous, with a real transfer of power (Peters 1987). A half-hearted delegation of authority, with continual checkups and monitoring of performance, is in reality no delegation of authority at all.
Juan is a manager of the Division of Forestry Research in the Department of Forest Resources. Having been manager for some time, Juan likes to keep control of things, particularly money. He insists on approving all expenditures for his division's activities, a requirement that causes significant bottlenecks in allocation and disbursement of funds, and poor timing of purchases. In fact, several studies have temporarily ground to a halt because of a lack of distribution of funds already received by the division, causing great frustration among scientists and research personnel. They view Juan's reluctance to delegate expenditure authority as an indication of his distrust of their competence and honesty.

For all this control, Juan's monitoring of expenditures for particular projects can be described as being somewhat loose. Even though he reviews every expenditure, he really hasn't structured a good system to periodically monitor expenditures against budgeted amounts. His oversight of the amount and rate of expenditures is inadequate, in part because he is so busy micromanaging expenditures and because of the lack of appropriate accounting systems. Juan blames cost overruns on underestimates of project costs, since projects often seem to run out of money before they are completed. During the past year, Juan has salvaged many of these underfunded projects by shifting money received from outside donors for particular projects to the accounts of the deficient studies. He then uses funds from newly approved projects to replenish the depleted accounts of the projects supported by outside donors.
Activity 1

What advantages might Juan enjoy if he were to delegate expenditure authority to certain scientists and researchers. Write your response in the space provided below.

1.

2.

3.

4.

Activity 2

What disadvantages might Juan experience by delegating expenditure authority to several of his subordinates? Write your response in the space provided below.

1.

2.

3.

4.
Advantages of delegating expenditure authority to certain scientists and researchers might include:

1. The purchase of supplies, equipment, and services would be more appropriate to the actual needs of the people doing the work.
2. Bottlenecks and temporary cessation of research activities due to delays in expenditure approvals would be eliminated or significantly reduced in frequency and severity.
3. Organizational performance should improve because of more timely completion of research projects/programs, and because of the greater authority of research team leaders and scientists who better understand the particular needs of their research programs.
4. A reduced workload for Juan, allowing him to focus on developing a more efficient and effective system to track overall division expenditures.
5. A more highly motivated staff who perceive that upper management trusts them and believes in their competence.

Some disadvantages of delegating expenditure authority to certain scientists and researchers might include:

1. A definite loss of control that Juan currently has over expenditures.
2. Some expenditures by project personnel may be inefficient, due to their inexperience or lack of knowledge of sources and prices for goods and services.
3. Expenditures by project personnel might not tap economies of scale, and thus would be greater for the same goods and services than through a centralized purchasing unit.
4. There is always the danger of misuse of this authority, either intentionally or through incompetence. Managers who delegate expenditure authority must strike a balance between being overly intrusive (with continual checkups), and being irresponsibly lax in financial oversight.
What do you think of Juan’s practice of using funds from projects to pay for funding deficiencies in others? Write your response in the space provided below.

How would better financial management procedures help to reduce the problem of funding shortages preventing completion of research projects?
Juan's practice of salvaging research projects deficient in funding by using funds allocated for other projects is a dangerous and often illegal practice. Audits will eventually expose this practice and might result in serious penalties, donor reluctance to continue funding, and considerable disruption of the division's research programs.

By designing and implementing better expenditure monitoring procedures per project, Juan can avoid dipping into other accounts to cover funding deficiencies. Projects that are exceeding their budgeted funding levels must be quickly identified in order to make mid-study corrections to reduce expenditure levels to that which is budgeted. And better planning when proposing projects for funding, with realistic estimates for implementation costs, and generous contingency accounts would also help to reduce the problem of funding shortfalls.
Summary

Managing funds is one of the most important, and to some managers one of the more distasteful, responsibilities of research managers. Managers must keep close track of all expenditures and obligations to ensure that budgets are adhered to and the research agenda is completed as planned. A difficult responsibility to be sure, though we never said that research management was easy!

In this short study unit, you learned of the importance of closely monitoring expenditures of research funds to ensure that budgets and expenditures are periodically reconciled. We showed you that the monitoring of expenditures can be a management tool used to track the progress of research activities. Yet you also learned that excessive monitoring or centralized control over expenditures can stifle productivity and employee moral. Finally, we showed you some of the advantages and disadvantages of delegating expenditure authority to subordinates.

If you would like more information about this topic, we encourage you to obtain and review the literature cited and other references listed at the end of the module. A key article directly related to the topics covered in the module, and cited in the text, is reprinted for your use in the section on readings at the end of the module.
Objectives

When you have completed this study unit you should be better able to:

- explain the importance of "promoting" your research program and capabilities; and
- develop a strategy and plan for influencing potential funders of research.
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Promoting Research Programs with Funding Agencies

In addition to the great deal of time research managers spend in developing the research program, they also devote considerable time to gaining support for their research program and organization. More than ever before, managers of research programs must actively promote their research programs to attract attention and financial and political support. They must promote the importance of forestry research, the capability of their organizations, and the utility of the research results. To attract the attention of funding organizations, managers need to understand the motivations and objectives of the funders, the amount of funds available, restrictions or limitations associated with each funding source, and the key decision criteria used by those who make funding decisions. Managers that neglect to aggressively market their research programs could find their organizations with declining and more erratic funding, and reduced political and popular support.

This study unit, though short, is extremely important. In it, we’ll briefly highlight some of the more important things to think about as you go about selling your research program. You’ll also learn several practical means to gain support from funders. Finally, you’ll find that promoting your research program requires long-term planning, and strategic thinking and action.

Promoting the Research Program
Today, more than ever, there is a need for managers of forestry research to promote their research programs so as to attract the attention and support of high-level policy makers and decision makers in government, industry, forest user groups, the general public, and international funding organizations. As Iyamabo (1992) has emphasized, "The ability to tap other sources [of funding] ... requires persuasive skills, well articulated project proposals, and a build-up of public confidence in the
institution." The job is to sell or market the capabilities of your forestry research organization to help solve some of the pressing problems facing society. An important part of this job is to sell yourself, to convince those responsible for approving and financing forestry research that you are capable of leading and directing an enhanced program of forestry research that will benefit the country and contribute to its economic and social development.

One way to do this is to work to have your forestry research organization play a role in policy deliberations at the highest levels regarding the management and use of natural resources, and in formulating national science policy. It is possible to do this, as Guevara-Moncada (1989) has reported for the forestry research organization in Honduras.¹ What it requires is a concerted effort at selling the importance of forestry to economic and social development, the potential contribution of forestry research to that effort, and the capabilities of the forestry research organization in carrying out the forestry research that is needed. This is clearly the responsibility of the forestry research manager.

In seeking research support from a prospective funding source, it is well to keep in mind that funders must:

• be aware of what you and your organization have done and plan to do in the future;
• be convinced that the research you propose to do is what they want done, and is what needs to be done to achieve the objectives they seek;
• have a positive perception of your research capabilities, and be convinced that you can and would satisfactorily complete the proposed research and meet their expectations;
• be convinced that the benefits of your research will exceed the costs; and
• be convinced that your research proposal is better than competing proposals.

Those seeking funding must thoughtfully consider these and other factors in developing a strategy and plan for submitting funding requests. For example, it is easy to overlook some of the more intangible benefits from proposed research that might strongly influence potential funders. It greatly helps to line up support for your proposal from potential users of the proposed research outputs, government policy makers and decision makers, and other stakeholders, who will vouch for the need and desirability of the proposed research and for the capabilities of your research organization, and will publicly support your proposal.

¹ Also, personal communication with Dr. Guevara-Moncada, August 1993.
Although gaining such support takes time, it can be highly productive in the long-run.

**Influencing Potential Funders of Research**

To develop a potential source into an actual source, the research manager needs to understand: the motivations and objectives of each funding source (proposals should be related to those objectives); the general magnitude of funds potentially available from each source (proposals should be geared to an appropriate request level); the restrictions and limitations associated with each source (proposals should be in line with such limitations); and the decision makers associated with each source and the key decision criteria they use in deciding among proposals. Where possible, it is desirable to contact directly those who actually will make the funding decisions, to personally discuss your proposed program and activities, capabilities, and interest in obtaining the funding.

To be effective in influencing potential funders, those seeking funding must understand the goals, objectives, and interests of the funding organization, and also those of the key players in that organization. One also needs to know how the organization operates in making funding decisions. Not until you understand the funding organization—what it is and how it operates—can you be effective in approaching them for funding. As a research manager, you will have to demonstrate to the funding organization how your research organization can help to further their interests and help them accomplish their objectives. Thus the first task in seeking funding is to educate yourself not only as to what funding sources exist (study unit 7.1), but also the funding disbursement strategies and operational guidelines of those whose support you seek.

Ruttan (1987) suggested several means for gaining support from potential funders:

- Prepare special, short, and easily read pamphlets and other publications showing potential and actual benefits of research.
- Organize special public events with wide participation such as opening and inauguration ceremonies of new research units, release of new cultivars, and other public activities.
- Provide lectures by researchers and research administrators during various public events.
- Organize visits and guided tours of research units with special emphasis on showing research results.
- Provide special advisory services to selected farms or whole regions.
• Undertake joint research projects with the private sector.
• Promote special programs for children or students, including specially selected schools from various neighborhoods. In some cases, parents can be easily influenced through the creation of a good image among their sons and daughters.
• Develop close working relationships with members of the media.
• Organize media programs on television, on radio, through popular newspapers, through magazine articles, etc.
• Make special efforts to establish good relations with the resource allocation and decision-making community such as: state and federal officials, legislators, and others.
• Participate in academic activities, when possible, with university systems, particularly through graduate training programs.

Other suggestions for improving your fund raising activities include:
• Keep donors on mailing lists to receive publications, newsletters, etc. from your forestry research organization.
• Get your forestry research organization on the mailing list of donors.
• Know the priorities of donors and keep track of changes and shifts in donor emphasis, often brought about by changes in personnel in the organization.
• Attend international meetings to develop personal contacts with donors and other groups—become more visible at the international level.
• Have some research proposals prepared in advance to take advantage of funding that suddenly becomes available.
• Train researchers and other staff to talk intelligently to donors about their concerns, and to represent your organization, should the occasion arise.
• Be prepared to present examples of the best of your organizational capabilities and success stories of accomplishments to potential donors, but also be able to effectively articulate and justify your research support needs.
• Conduct guided field trips to provide concrete visual impressions of your research accomplishments.
• Conduct benefit/cost analyses (including intangible costs and benefits) to help convince donors of the potential returns from proposed research.
A key to success in obtaining support from almost any type of funding institution is a well-written research proposal. Although many agencies have their own explicit guidelines for proposal writing, Study Unit 7.2 provided some general guidelines. An important part of that proposal is the careful and thoughtful preparation of a budget (Study Unit 7.3).

**Maintaining Effective Public Relations**

An important part of marketing your research program is maintaining an effective public relations effort to inform your clients and the general public about your organization and its research programs. An effective public relations program can make people aware of who you are and what you can do, and can lead to increased support for your research programs.

Public relations programs can be carried out in many ways. News releases regarding new research program activities and interesting research findings, personnel changes, and other activities that may be of interest to the target audience, can be prepared and distributed to appropriate local, regional, and national news media. Scientists or administrators can be interviewed on radio or television programs about topics or developments of particular importance, or special programs for these media can be prepared and offered for their use. Newsletters can keep research clients, funders, and other critical contacts informed about your organization’s activities and special events. Field demonstration days and tours of laboratories and other research facilities can be developed and publicized to attract members of the public and/or special client groups. A special effort can be made to provide technical information fact sheets that would be useful to client groups and the public. It also may be possible to provide a technical information service that is available on request. These are only some of the things that can be done to establish and maintain good relations between your organization and the public upon which you depend for support.

But public relations should be a two-way communication path—that is, part of public relations is maintaining a visible point of contact that is available to those who wish to contact your research organization to either obtain information or convey some message. Such a point of contact, whether it be an address to which to write, a telephone or fax number that can be called, or a place to visit, should be manned by personnel who are knowledgeable about your organization, are sensitive to the need to maintain good public relations, and can deal effectively with the public.

Such a public relations effort cannot be left to chance. Someone within your organization should be charged with developing and
maintaining an effective public relations program. In small organizations, it may be possible for one person to carry out this activity as part of their other work. Larger organizations may find it desirable to establish a position of public affairs or information officer, with a small staff of people to carry out this job. But regardless of who does the work, it is essential that they recognize the importance of the job and be capable of carrying it out effectively.

**Thinking and Acting Strategically**

To be effective in marketing the research program, it is important to think and act strategically. That is, one should concentrate one’s attention and effort on those things that are of particular importance at a given time, especially those that are likely to have a significant impact on the organization in the future. The following suggestions may help you think and act strategically:

- Maintain good public relations with those outside the organization to facilitate the exchange of information. Keep in frequent personal touch with key people who are in a position to affect your organization, or who can keep you informed about events that may affect you.

- Improve your knowledge about what is happening in the world around you and your organization that may affect its activities. Although you can do much of this yourself, you may need help to keep track of things. Managers often complain that they are the last persons in the organization to find out about emerging problems. You can become more aware of developments within your own organization by developing and maintaining good working relations with your employees. It also helps to develop some sort of informal intelligence network among key people in your organization to keep abreast of current happenings.

- Anticipate, identify and focus on a few key emerging issues that are likely to impact your organization, and make sure that you are up to date on these issues. Develop appropriate responses for your organization prior to anticipated changes in these issues. You may need to be prepared for prompt action in response to rapid changes in legislative or executive policies, or in economic or social conditions.

- Concentrate on those tasks that are likely to have a major impact on your program activities, delegating responsibility and authority for tasks of lesser importance to subordinates who have the ability to handle them. This means, of course, that some attention must be given to developing that ability among subordinates.
• Pay particular attention to the timing of your efforts. For example, crucial budgeting decisions affecting your research organization are often made during one short week, or even within a few days. It is of utmost importance that you know how those decisions are made, who makes them, and when they are made, so that you can give your full attention to that decisionmaking process. As managers, you should make every effort to be physically present during these critical periods to defend budget requests and ensure adequate funding levels for your organization.

Although marketing and promoting the research program is an important management function, there is a need to strike a balance between marketing efforts to improve the organization, and the management of the organization as it exists today.
To illustrate the process of marketing forestry research programs, we again revisit our friend Anita, a research manager for a forestry research organization in a developing country. Please read the situation below and complete the exercises that follow.

**Situation Analysis**

Anita is the research manager for a national forestry research organization in a tropical developing country. She and her scientists feel they do a good job identifying and incorporating the latest issues facing forest science in her country into their research agenda. She feels proud that her organization’s research program is producing large gains in knowledge on the biology of her country’s tropical forests and their management. Her scientists are well known in their disciplines, produce high quality research, and publish their results in international journals. While she feels that the results of their research will eventually be used, Anita grudgingly admits that there is really no mechanism to extend the information to those who could use it, other than through scientific journals.

Her organization doesn’t often publish nontechnical reports for the public, or hold guided tours, public events, or promotions of her research units, since their research deals with complex topics which she feels the public wouldn’t understand. Anita doesn’t see this as her problem; after all, her responsibility is managing research, and she really doesn’t enjoy or have time to deal with the public. She does have a vague notion that she needs to be more in touch with people other than scientists. She barely knows any of the funding agency decision makers, media representatives, or leaders in the community. But she feels that since she sees these and other natural resource professionals, politicians, and upper-level policy makers at parties several times a year, that should be enough. Again, she’s a scientist, not a politician!

Thus, Anita is increasingly disturbed at the declining support her research organization is receiving from the national government, particularly for core funding. Her record at obtaining external funds is also lacking. Despite her institution’s excellent scientific performance, it nevertheless constantly (and unsuccessfully) struggles to acquire adequate funding to implement its research agenda. She submits her budget each year and meets all the requirements and deadlines, yet is consistently told that financial resources are ever more limited and that her planned programs must be curtailed. While she senses these decision makers know little of her research programs or their impacts, she feels her unit’s research accomplishments are so self-evident that decision makers must be aware of them.

Despite the cutbacks her unit chronically endures, other research programs within the government seem to be expanding in scope. And these other programs seem to attract other external funds as well. Anita attributes their success to the organizations’ aggressive managers and directors, whom she feels insincerely play up to funders in order to obtain funding. It seems these managers spend more time in the capital than do the politicians in knowledge on the best use of their budgets on promotional material to distribute to funding organizations and decision makers, as well as thinly disguised promotional events with extensive media coverage, a waste of precious research money in her opinion!
It should be clear that Anita needs to reorient her thinking regarding the marketing of her research program! Should Anita have a change of heart and begin to aggressively market her research program to seek funding and political support, what should she first consider? Write your response in the space below.

1.

2.

3.

4.

What is Anita doing wrong in her approach to marketing her forestry research organization and its program? Write your response in the space below.
When marketing her research programs, Anita needs to ensure that potential funders:

1. Understand what her organization has accomplished, and plans to accomplish in the future;
2. Be convinced that the research proposed addresses important and critical problems that are of high priority not only to the research organization itself, but also to the funding organization;
3. Have a positive perception of her organization's research capabilities, and be convinced that her research organization can complete the research and meet the funder's objectives;
4. Conclude that her organization's research proposal is better than competing proposals.

While Anita excels at managing some aspects of her research program (i.e., producing quality research, addressing emerging issues in forest science), she needs considerable improvement in her marketing and public relations. She is failing to capitalize on her organization's strong points in order to improve the organization's funding situation. Generally speaking, she is failing to:

1. Gain public understanding and support of her organization's research program;
2. Establish contacts and cultivate personal relationships with decision makers in funding organizations and the government;
3. Gain political support for her research organization; and
4. Thoroughly inform decision makers of the accomplishments of her research organization, and of the utility, and value of research results produced.
There are many means to gain support from potential funders. List several of them in the spaces provided below.

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8.
Means to gain support of potential funders include:

1. Prepare special, short, and easily read pamphlets and other publications showing potential and actual benefits of research;

2. Organize special public events with wide participation such as opening and inauguration ceremonies of new research units, release of new cultivars, and other public activities;

3. Provide lectures by researchers and research administrators during various public events;

4. Organize visits and guided tours of research units with special emphasis on showing research results;

5. Provide special advisory services to selected farms or whole regions;

6. Undertake joint research projects with the private sector;

7. Promote special programs for children or students, including specially selected schools from various neighborhoods;

8. Develop close working relationships with members of the media;

9. Organize media programs on television, on radio, though popular newspapers, magazine articles, etc.;

10. Make special efforts to establish good relations with the resource allocation and decision-making community such as: state and federal officials, legislatures, and others; and

11. Participate in academic activities, when possible, with university systems, particularly through graduate training programs.

Finally, remember that a well written research proposal, and a strategic approach to the funding process, is essential to successfully obtain research support.

We hope you listed at least some of these means to gain support from funding organizations. By implementing these actions, you can dramatically increase the chances of successfully obtaining funding for your organization's activities.
An important and growing responsibility of forestry research managers is the promotion and marketing of their organization's research programs to attract the attention and support of high-level policy makers and decision makers in government, industry, forest user groups, the general public, and international funding organizations. Marketing research programs requires that managers inform prospective funding sources of the accomplishments and capacity of the research organization, and convince them that the proposed research meets their needs, and that the research organization has the capacity to successfully implement the research. Further, a well-written and well-presented research funding proposal is an essential part of the marketing process.

This brief unit was designed to provide you with a broad overview of the importance of promoting research programs, as well as provide some practical suggestions of how to successfully market the program to funding organizations and decision makers. Research managers who utilize these suggestions will enhance their organization's success at attracting political and financial support for their research programs. Research managers who fail to market their programs will, like our fictitious Anita, unfortunately find support and funding for their research programs diminishing over time.

If you would like more information regarding marketing your research program, we encourage you obtain and review the interesting articles identified in the literature cited and other references listed at the end of the module. A key article directly related to the topics covered in the module, and cited in the text, is reprinted for your use in the section on readings at the end of the module.
Below are listed a number of skill and knowledge statements derived from the objectives of the study units in module 7. These are identical to those listed in the initial skill and knowledge assessment at the beginning of the module. Now that you have completed all of the study units in the module, please read each statement carefully and indicate with a checkmark the level that best describes your current skill or knowledge, from 1 to 5, using the following descriptions:

1. I cannot perform this skill, or I have not been exposed to the information.
2. I cannot perform this skill, but have observed the skill or have been exposed to the information.
3. I can perform the skill or express the knowledge with assistance from others.
4. I can perform the skill or express the knowledge without assistance from others.
5. I can perform the skill or express the knowledge well enough to instruct others.

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<thead>
<tr>
<th>Skill or Knowledge Statement</th>
<th>Your Level of Skill or Knowledge</th>
</tr>
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<tbody>
<tr>
<td>a) Describe the advantages and disadvantages of long-term core funding and short-term project funding.</td>
<td>1 2 3 4 5</td>
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<tr>
<td>b) Recognize the variety of sources from which research funding is obtained.</td>
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<tr>
<td>c) Structure and outline funding requests and proposals to address both the requirements of the funder and your own research institution.</td>
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<td>d) Describe a procedure that can be used to evaluate proposed research projects and programs.</td>
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<td>e) Develop appropriate budget formats for research programs, projects, and studies.</td>
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<td>f) Use a matrix approach to cope with dual budget systems.</td>
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<tr>
<td>g) Recognize potential problems encountered in annual budgeting.</td>
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<td>h) Understand the importance of closely monitoring expenditures in managing accountability in the use of funds.</td>
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<tr>
<td>i) Recognize the need for and importance of periodically reconciling planned (budgeted) and actual expenditures.</td>
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<tr>
<td>j) Explain the importance of marketing your research program and capabilities.</td>
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<tr>
<td>k) Develop a strategy and plan for influencing potential funders of research.</td>
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LITERATURE CITED - Module 7


LITERATURE CITED - MODULE 7


ADDITIONAL SOURCES OF INFORMATION


APPENDIX 7.1

SELECTED ADDRESSES OF NATIONAL AND INTERNATIONAL ORGANIZATIONS FUNDING AND/OR COLLABORATING ON FORESTRY RESEARCH

African Development Bank
B.P. 1387
01 Abidjan
COTE D'IVOIRE, WA
Tel. Office +225 32-07-11
32-50-10/3533

The African Development Bank
Group (AfDB)
101 Moorgate
London EC2
UNITED KINGDOM
Tel. Office +44-71-638-0608, 6350

Aga Khan Foundation
rue Versonnex 7, Postfach 435
CH-1211 Geneva 6
SWITZERLAND
Cable AKFGVA GENEVA

Arab Fund for Technical Assistance
to Africa and Arab Countries
37 rue Kheireddine Pacha
Tunis
TUNISIA
Tel. Office +216 (01) 89-01-00

Asian Development Bank
Agriculture and Rural Development
Department
2330 Roxas Boulevard
P.O. Box 789
Metro Manila 2800
PHILIPPINES
Tel. Office +63-2-711-3851
Fax +63-2-741-7981

Australian Centre for International
Agricultural Research
3rd Floor, Drake Centre
10 Moore Street, P.O. Box 1571
Canberra, A.C.T. 2601
AUSTRALIA
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Note: This list is meant only to be representative of the wide range of organizations that fund and/or collaborate on forestry research. The organizations and addresses given here were current in 1993, but are subject to change, and may no longer apply.
READINGS FOR MODULE 7

The following reading has been selected to provide you with additional information related to the material covered in module 7. We hope you will find it of interest.

Forestry Research Funding in Nigeria

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ABSTRACT
Adequate funding is essential in order to maintain a healthy pace of scientific and technological research and development. In Nigeria, funding for forest research has not followed any consistent pattern but has generally been inadequate and sporadic. In recent times, especially since the commencement of the ongoing cash squeeze, the funding situation has worsened. Funds allocated to forestry research have been on the decline but are largely adequate for the payment of salaries and wages, leaving very little for research project execution, maintenance of research facilities, and development of infrastructure. This situation is not peculiar to Nigeria, however, as there has been, in more recent times all over the world, expressed concern about the poor funding of research and development and the need to reverse the phenomenon. Thus the Organisation of African Unity’s Lagos Plan of Action (1980) recommended to member states the annual provision of at least 1% of their nation’s GDP for science and technology activities by the year 1990. On the local scene, policy statements have also been made with respect to the proportion of the nation’s revenue to be earmarked for R&D. The national agricultural policy recommended 3%, whilst the national science and technology policy recommended 5% of the nation’s annual budget for agricultural research activities and science and technology development respectively. However, whilst the concretisation of these laudable policy objectives is being awaited, other options for improving the level of funding for forestry research in Nigeria are already in place or are being proposed. There is a need to exploit non-federal sources of fund for boosting the total appropriations for forestry research from Nigerian sources and also deliberately to exploit the technical assistance opportunities offered by bi-lateral and multi-lateral aid agencies to ensure steady supply of research equipment and spare parts, which local currency finds difficulty in supplying because of inflation.

Keywords: Nigeria; forestry; geography; economy; forestry research; funds; research management; science and technology.

INTRODUCTION
As Nigeria inevitably joins other Third World countries in experiencing unavoidable economic restructuring, sectorial allocation of funds becomes a very painful exercise, in that resources available to Government become inadequate for executing the various large Government programmes. The unstable economic fortunes of the country, as in most countries, as well as political experiences, have dictated the organisation, direction, and the amount of funds available to forestry research over the years. Thus, forestry research has been the concern of extra-Ministerial Departments under various Ministries, a sector of the Agricultural Department of the Agricultural Research Council of Nigeria, a Research Institute under the National Science and Technology Development Agency, an Institute in the Agricultural Sciences Department of the Federal Ministry of Science and Technology, an Institute in the Federal Ministry of Education, Science and Technology, and currently the Agricultural Sciences Department of the Federal Ministry of Science and Technology. The orientation of the programmes of work on forestry research has also metamorphosed along the direction of the organisational arrangement of the supervisory Ministry, from highly development-relevant projects and strong linkages with the State Forestry Services that existed under the Federal Ministry of Agriculture extra-departmental status, i.e., prior to and up to 1970, to loosely relevant projects and weaker linkages that existed under the various Science and Technology umbrellas where science and technology policies dictated the direction of research.
Forestry research funding has also varied with the economic and political circumstances of the nation. The personnel costs are invariably fixed obligations as sufficient funds are usually made available to support approved establishments. Funds for research (operations and maintenance) are, however, affected by the vagaries of the economy of the country. Although there is still no shift in Government policy of funding forestry research in Nigeria, various signals from the present precipitous trend of funding and pronouncements from Government functionaries are indications that the Forestry Research Institute, which is the major forestry research agency in Nigeria, should substantially increase its revenue base to provide the needed shortfall between projected and actual requirements. Funds for forestry research are regularly affected by the envisaged increase of its revenue base to provide the needed shortfall between projected and actual requirements.

This paper provides background information on the geography, economy, and forestry research organisation and management in Nigeria to set the scene for a better appreciation of the forestry research problems in Nigeria, the sources of funds currently available to forestry research, and the potential sources that can be tapped to considerably improve the level of funding of forestry research activities in Nigeria.

**BACKGROUND**

**Geographical perspective**

Nigeria has been referred to as the most populous nation in Africa with a population "estimated" at 120 million people. It is one of the wealthier and more self-sufficient African countries, and is also a well-endowed country in human and material resources terms. Nigeria is located in the western part of the African continent slightly north of the equator, lying between latitudes 4° and 14° north of the equator, and longitudes 3° and 14° east of the Greenwich Meridian.

It is bounded on the west by the Republic of Benin, on the north by Niger Republic, on the east by the Republic of Cameroon, and it is washed on the south by the Atlantic Ocean. The country has an area of 913,072.64 km², and is well watered by rivers Niger and Benue and their tributaries which drain into the Atlantic Ocean that washes the southern part of the country. The climate varies from tropical at the coast to subtropical further inland. There are two well-marked seasons—the dry season lasting from November to March and the rainy season from April to October.

Temperatures at the coast seldom rise above 90°F, but humidity is high. The climate is drier further north where extremes of temperature are more common, sometimes reaching as high as 110°F and falling to 50°F. The above climatic profile is matched with a rich variety of vegetation cover, starting with a narrow band of brackish/mangrove and fresh water swamp forest along the coast. Further inland, where the rainfall is over 2000 mm per annum, is the lowland rain forest/tropical humid forest/tropical high forest which produces the well-known timber species and is the major source of Nigeria's timber. North of this is a broad belt of Guinea savanna (northern and southern) extending from latitude 7.5 N to 11 N approximately, with an average rainfall of 1200 mm per annum. In the northern part of the country (the 'arid' north) is the Sudan savanna, where the rainfall is between 1000 mm and 500 mm per annum. At the extreme north-east, where the rainfall drops below 500 mm per annum (down to 200 mm), occurs the Sahel savanna. Figure 1 shows the forest regions of Nigeria.

**Economic perspective**

Perhaps the best launching pad for the consideration of funding forestry research in Nigeria is a preview of the economic profile of the country. According to Anon (1988) the advent of petroleum into the Nigerian economy in the late 1960s and early 1970s heralded an increase in government revenue, a noticeable rise in industrial investment both in the public and private sectors, a balance of payment surplus, growth in construction industries, rapid urbanisation, and ostensible advancement in educational, health, and infrastructural development. Before the end of the 1970s, it was clear that the oil sector provided over 90% of government revenue. The world economic recession which occurred in the early 1980s brought with it a down-turn in the general economic development of the country. The oil glut in the world market led to a decline in oil prices which in turn brought about a decline in the oil revenue available to the government. Consequently, the country could no longer support massive import of raw materials, food, and spare parts. There was a noticeable deficit in balance of payments, a deep down-turn in agricultural output, and an acute shortage of foreign exchange. Other problems included a decline in industrial output, a close-down of factories, loss of job opportunities, a high rate of inflation, and a loss in purchasing power of the naira (the Nigerian currency). These problems forced the government to implement its economic austerity measures, thus creating the imbalance in the current account of the nation by channeling resources to the relatively more prosperous sectors of the economy, such as petroleum, construction, and quarrying, as well as others.
forced the government to adopt the Structural Adjustment Programme (SAP) which aims at correcting the imbalance in the economic development of the country by channelling resources to the productive sectors of the economy, such as agriculture, mining, and quarrying, as well as industry.

**Past and current forestry research efforts in Nigeria**

Approximately 11% of the country's total land area of 913,072.64 km² is reserved forest estate. Out of this, 80% is savanna woodland and 20% (or 2% of the total land area) is high forest. This zone supplied the export timber that earned the country much foreign exchange before the ban on timber exports and continues to supply the growing internal demand for industrial, construction, and furniture wood.

Prior to independence in 1960, for sustained yield, the reserves in the high forest zone were managed on a felling cycle of 100 years. In 1962, the felling cycle for the tropical high forest was reduced to 50 years to make available larger areas for exploitation to supply the need of the rapidly growing wood-based industries and to produce export timber for foreign exchange. Although export of timber was banned in 1975, the internal consumption of wood had grown to such a magnitude that by the 1980s forest exploitation had become virtually unregulated, and timber was being removed from the reserves on a massive scale, both legally and illegally (Umeh 1991).

The research efforts of the old Forestry Services in the 1920s and 1930s centred on the stimulation of natural regeneration of the high forest through climber cutting and poisoning of uneconomic trees with sodium arsenite. Kio and Ekwebelam (1987) summarised the four systems investigated during 1927–36 in the thick rain forest of Sapoba. The Tropical Shelterwood System (TSS) was the most widely adopted. The TSS involved extensive poisoning of all non-commercial shade casting trees within the lower and middle layers.

**FIGURE 1**—Forest regions of Nigeria (source Onweluzo 1979)
lacked executive powers, being essentially only advisory. The autonomous NSTDA had representation in the Federal Executive Council unlike the NCST, its predecessor. The NSTDA became the Federal Ministry of Science and Technology (FMST). There was a brief association with the Federal Ministry of Education in 1984 but the FMST is currently an autonomous ministry.

**OVERALL MANAGEMENT OF RESEARCH**

The National Policy on Science and Technology provides for a National Council on Science and Technology (NCST) as the consultative body of the Federal Ministry of Science and Technology. The body comprises all State Commissioners for Science and Technology together with representatives from the Federal Ministry of Agriculture and Natural Resources, universities, and the private sector, and has four advisory technical sub-committees. The Forestry Research Institute of Nigeria is a prominent member of the Agriculture sub-committee. These sub-committees have been assigned a general mandate to (i) review and promote research and development activity, (ii) identify and highlight priority areas for research development, (iii) promote and foster collaborative efforts among researchers, and (iv) provide mechanisms for the acquisition, storage, and dissemination of science and technology information.

The Federal Ministry of Science and Technology is vested with overall responsibility for managing the institute through its Department of Agricultural Sciences which is responsible for the development and conduct of the separate research programmes of 18 agricultural institutes.

The Federal Ministry of Agriculture and Natural Resources has its own consultative body, the National Council for Agriculture which has the Director of Agricultural Sciences Department of the Federal Ministry of Science and Technology as a key member. The agricultural policy for Nigeria calls for adequate funding over sustained periods with not less than 3% of the Federal budget allocated to agricultural research for the development of technologies relevant to the needs of Nigerian farmers.

The Forestry Research Institute of Nigeria has a Governing Board which has the Director of the Institute as its Secretary. The Governing Board has formal management responsibilities in deciding priorities, staff appointments, discipline and promotions, and manpower development for the Institute.

The Director of the Institute has responsibility for the day-to-day running of the Institute under the Governing Board and is accountable to the Federal Ministry of Science and Technology.

**ALLOCATION OF FUNDS FOR AGRICULTURAL RESEARCH**

Financing of agricultural research is derived to a large extent from public funds. The main justification for public financing of agricultural research is that the public as a whole benefits from application of the results. Therefore, in contrast to industrial research, government financing generally constitutes the major source of support for agricultural research. Sources of government funds vary from country to country. In the United States for example, non-federal funds could account for about 75% of the total appropriations for agricultural research. According to Peterson (1969) state appropriations make up about 70% of non-federal funds, the amounts from this source evidently depending on each state's tax base and willingness to tax its citizens. Grants from foundations and industry account for about 7% of all non-federal funds, and revenues from fees and sales for about 15%.

The situation in developing countries does not agree with this ideal arrangement as the proportion of non-federal funds out of the usually very low total appropriation to agricultural research is insignificant. This is why in 1964 the Lagos conference on the organisation of research and training in Africa, following a study by UNESCO and ECA on the conservation and utilisation of natural resources, recommended that 0.5% of the GNP should be invested in research on natural resources. The conference proposed that one fifth of the amount should be devoted to basic research and the rest to applied research (Robinson 1970). In Nigeria, the national agricultural policy stipulates that about 3% of the national annual budget should be allocated to agricultural research activities. Similarly, a major policy objective of the national science and technology policy is that the Federal Government is to fund science and technology development up to a level of 5% of its annual budget.

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual export expenditure (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>12.0</td>
</tr>
<tr>
<td>1982</td>
<td>88.9</td>
</tr>
<tr>
<td>1983</td>
<td>73.9</td>
</tr>
<tr>
<td>1984</td>
<td>11.8</td>
</tr>
<tr>
<td>1985</td>
<td>59.5</td>
</tr>
<tr>
<td>1986</td>
<td>36.7</td>
</tr>
<tr>
<td>1987</td>
<td>26.8</td>
</tr>
<tr>
<td>1988</td>
<td>20.7</td>
</tr>
<tr>
<td>1989</td>
<td>35.0</td>
</tr>
<tr>
<td>1990</td>
<td>44.2</td>
</tr>
<tr>
<td>1991</td>
<td>62.5</td>
</tr>
</tbody>
</table>

However, these policy statements have not always been translated into reality, perhaps because other sectors are demanding more than ever before. Reflecting the extent and nature of technology innovation through experience, such efforts have in the past been successful in a time of uncertain funding. Research has suffered more than any other sector in allocation exercises. Under various research categories, national appropriation for agriculture (except the livestock subsector in 1953/54) fell from 20.9% of all federal funds in 1952/53 to 0.5% in 1972/73. The situation improved during the 1970s, but it has not been translated into a sustained increase in funding. In Nigeria, the situation has been exacerbated by the economic downturn and the mismanagement of funds with other ministries.
TABLE 1—Capital allocation to 24 Research Institutes in Nigeria (1981–91)

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual capital allocation naira (millions)</th>
<th>Equivalent in US$ (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>112.0</td>
<td>203.64</td>
</tr>
<tr>
<td>1982</td>
<td>85.84</td>
<td>156.07</td>
</tr>
<tr>
<td>1983</td>
<td>73.12</td>
<td>132.94</td>
</tr>
<tr>
<td>1984</td>
<td>11.83</td>
<td>15.36</td>
</tr>
<tr>
<td>1985</td>
<td>30.15</td>
<td>33.87</td>
</tr>
<tr>
<td>1986</td>
<td>3.57</td>
<td>2.04</td>
</tr>
<tr>
<td>1987</td>
<td>5.63</td>
<td>1.38</td>
</tr>
<tr>
<td>1988</td>
<td>25.57</td>
<td>5.63</td>
</tr>
<tr>
<td>1989</td>
<td>38.00</td>
<td>5.08</td>
</tr>
<tr>
<td>1990</td>
<td>44.20</td>
<td>5.27</td>
</tr>
<tr>
<td>1991</td>
<td>52.30</td>
<td>5.50</td>
</tr>
</tbody>
</table>

However, these policy statements have not been translated into reality, possibly because numerous other sectors are contending for available funds. What has happened over the years can best be regarded as reflecting the esteem accorded to science and technology innovation through research. Research efforts have in the past been frustrated by very low and uncertain funding. Research and development have suffered more than any other sector during budget allocation exercises. Idachaba (1981), aggregating research categories, noted that allocations for research on agriculture (crops), livestock, fisheries, and forestry fell from 20.97% of all federal expenditures on these subsectors in 1953/54 to only 5.74% in the 1975–80 plan. He concluded that these historical allocations were clearly inconsistent with the dominant position of agriculture, livestock, fisheries, and forestry during the period. The position has not improved in subsequent plan periods.

In Nigeria, the socioeconomic development policy has been spelled out since independence in 1960 in 5-year development plans, and from 1990 in 3-year rolling plans. Capital estimates are usually proposed around the yearly provisions in the plan. In the plans, the goals to be met are established and the focus of government for each plan period is usually expressed as a theme. Funding of Research Institutes is by the Federal Government through the Federal Ministry of Science and Technology. The Ministry contests for available funds with other ministries through the normal budgetary approach. The Minister for Budget and Planning is responsible for advising the Federal Government on available receipts and budgetary allocations to the various ministries depending on government priorities. For example, receipts and government priorities have been the criteria for allocating funds to ministries.

Prior to the 1990 fiscal year, capital allocations to agricultural research had been aggregated for each research institute under the general capital subvention to the supervisory Ministries. This allocation procedure was not favored by Directors of research institutes who argued that:
1. the research institutes themselves were in a better position to defend their budget proposals than the supervisory Ministry;
2. that the "rule of thumb" criteria used in deciding on the relative shares to be allocated to different areas of research was not rational and was subjective;
3. that personal biases of administrators, directors of research institutes, and other interested persons did influence the sharing out of research allocation to the research institutes.

From the 1990 fiscal year, however, the research institutes began to have the opportunity to defend their budget proposals individually before the Ministry of Finance and to have appropriations made on capital project basis. What is eventually released to the institutes is, however, still decided by the Ministry of Science and Technology which receives aggregated capital subvention on behalf of the research institutes.

A trend analysis on capital allocation to the 24 research institutes in Nigeria, excluding universities, in this study indicated a general decline in annual appropriation to the establishments since 1981. Table 1 gives aggregated capital allocations to 24 research institutes in naira and United States dollar equivalents.
may be negligible in view of the fact that purchase of spare parts and replacement of equipment require foreign exchange procurement.

CURRENT SOURCES OF FUNDS FOR FORESTRY RESEARCH ACTIVITIES IN NIGERIA

The Federal Government of Nigeria is the major sponsor of forestry research activities in Nigeria. This it does by way of direct capital subvention through the supervisory Ministry to the Forestry Research Institute of Nigeria which is the main organisation with a forestry research mandate in Nigeria. Although there are no statistics to assess the percentage of non-Federal funds coming to research, it can be safely concluded that Federal funds contribute over 95% of total regular funds available to forestry research.

Figure 2 presents total capital appropriation to the various research programmes of the Forestry Research Institute of Nigeria for the years 1981-91. The situation observed here is similar to that of other research institutes and that of aggregate capital appropriation to all the research institutes during the period. The trend also reflects that of the nation’s economy—real capital allocation has remained static and not commensurate with the slight increases in capital appropriation to the Forestry Research Institute from 1987.

The total funding for forestry research declined substantially from a peak in the early 1980s until 1986. Thereafter, in current naira terms the funding has been increasing. A historical summary is given in Table 2.

However, the increases have not kept pace with the high inflation rate. For example, even to maintain the low funding levels of the 1984–87 period in real terms, the 1991 funding should have been N4.18 million. In US dollar terms, by 1991 funding had fallen to less than one fifth of the level in 1981, even though in naira terms the difference is less than one-quarter. The implications of this are very serious, as many research items (i.e., equipment, spare parts, journals, laboratory reagents, and equipment) have to be imported and paid for in foreign exchange.

Internally generated revenue is becoming increasingly visible as a source of funds for forestry research in Nigeria. The Government is further encouraging research organisations to generate funds for research through the establishment of pilot production schemes aimed at commercialising research results. Examples of such projects undertaken at the Forestry Research Institute of Nigeria include manufacture of wood cement floor tiles and ceiling boards and glue laminated wooden furniture items, and commercial production of tree seedlings. The Institute also provides consultancy services to the public, especially to the wood-based industries interested in direct forest plantation. Substantial revenue is derived from fixed deposits. Table 3 shows the contribution of internally generated funds over the period 1985–90.

![TABLE 2 — Annual capital allocation to FRIN (1981–91)](image)

<table>
<thead>
<tr>
<th>Year</th>
<th>Naira (millions)</th>
<th>US$ (millions)</th>
<th>Exchange rate (Ex. Central Bank of Nigeria)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>6.00</td>
<td>10.91</td>
<td>0.55</td>
</tr>
<tr>
<td>1982</td>
<td>3.10</td>
<td>5.64</td>
<td>0.55</td>
</tr>
<tr>
<td>1983</td>
<td>3.15</td>
<td>5.73</td>
<td>0.55</td>
</tr>
<tr>
<td>1984</td>
<td>0.44</td>
<td>0.57</td>
<td>0.77</td>
</tr>
<tr>
<td>1985</td>
<td>0.078</td>
<td>0.08</td>
<td>0.89</td>
</tr>
<tr>
<td>1986</td>
<td>0.18</td>
<td>0.10</td>
<td>1.75</td>
</tr>
<tr>
<td>1987</td>
<td>0.25</td>
<td>0.06</td>
<td>4.06</td>
</tr>
<tr>
<td>1988</td>
<td>1.61</td>
<td>0.35</td>
<td>4.54</td>
</tr>
<tr>
<td>1989</td>
<td>1.92</td>
<td>0.23</td>
<td>7.47</td>
</tr>
<tr>
<td>1990</td>
<td>1.66</td>
<td>0.20</td>
<td>8.39</td>
</tr>
<tr>
<td>1991</td>
<td>1.81</td>
<td>0.19</td>
<td>9.51</td>
</tr>
</tbody>
</table>
interested in direct forest plantation establishment.

Substantial revenue is also derived from interest earned on fixed deposits. Table 3 indicates the increasing contribution of internally generated revenue over the period 1985-90.

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue (000 naira)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>199.1</td>
</tr>
<tr>
<td>1986</td>
<td>295.9</td>
</tr>
<tr>
<td>1987</td>
<td>214.4</td>
</tr>
<tr>
<td>1988</td>
<td>271.9</td>
</tr>
<tr>
<td>1989</td>
<td>339.4</td>
</tr>
<tr>
<td>1990</td>
<td>342.9</td>
</tr>
</tbody>
</table>

The Forestry Research Institute of Nigeria also derives funds from extra-budgetary sources, especially those within the portfolio of the National Committee on Environmental Problems. This agency of Government makes funds available to individuals and organisations which have expertise in solving identified environmental problems. So far, the Institute has won the following projects under the Ecological Disaster Funds: the gully erosion afforestation project, the sand dune fixation project, the jujube research project, and the shelterbelts research project. These extra-budgetary projects are short-term, lasting between 3 to 5 years. The projects are invariably relevant to the mandate of the Institute, and the funds for the projects have much linkage effect as they go a long way towards providing the much needed vehicles, laboratory, and field equipment which can also be used for other research activities of the Institute. Extra-budgetary funds are made available to the Institute at the inception of the projects, thus allowing the Institute the opportunity to earn additional revenue through interest on fixed deposit.

Foreign currency allocations, a key component of the financial requirements, are often inadequate to maintain and operate laboratory and experimental station facilities and libraries. Donor support for specific projects are carefully chosen such that they provide the financial flexibility to cover foreign currency requirements in other parts of the research system. The Institute has so far enjoyed support from the following donor agents:

1. The Overseas Development Agency (ODA) of the British Government cooperated with the Forestry Research Institute of Nigeria by funding the West African Hardwoods Improvement project (1971-77).
2. The International Development Research Centre (IDRC) of Canada in the early 1970s assisted in setting up the Shelterbelt Research Station in Kano. The Agency provided funds for the purchase of the much needed equipment and overseas training of staff.
3. The Japanese International Cooperation Agency (JICA) cooperated with the Forestry Research Institute of Nigeria on the FRIN/JICA (August 1986-August 1991) Trial Mechanised Afforestation Project in semi-arid areas. This project contributed short- and long-term experts in various disciplines, staff overseas training, infrastructural development, and supply of machinery and equipment.
4. Other external agencies included the Food and Agricultural Organisation (FAO) and United Nations Development Programme (UNDP), the twin organisations that assisted with the establishment of the savanna forestry research station in 1964.

OTHER POTENTIAL SOURCES OF FUNDS FOR FORESTRY RESEARCH IN NIGERIA

In other countries, state contribution to forestry research is appreciable. In Nigeria, however, apart from the experimental sites in forest reserves, the states do not contribute financially to forestry research. Up until now, the assumption has been that research plots revert to the states at the termination of forestry research experiments, leaving the states to benefit from the plots. Now that the Institute is faced with the very high cost of establishing experimental plots, and low funding from government, the Institute may have to revise this assumption and enter into formal agreements with the states on a formula for sharing the proceeds from the sale of forest resources on experimental plots.

The Institute has so far relied on the Supervisory Ministry to recommend to it donor agents. It may become necessary for the Forestry Research Institute to take the initiative in searching for sponsors of its very important projects. The mangrove research project, utilisation of small-diameter, plantation-grown logs, timber engineering, solar kiln drying, and wood...
preservation are projects which are not popular in the donor agency list available to the Federal Government of Nigeria.

The Ministry of Science and Technology, mindful of the dwindling resources available to Science and Technology Development, has set up a National Science and Technology fund from which funds are made available on competitive basis to scientists and organisations involved in science and technology development, in accordance with the national policy guidelines and strategies. Contributors to the fund include the Federal Government and its parastatals, the State Governments, and the private sector.

The Federal Ministry of Science and Technology has recently received a Federal Government approval for an International Development Association (IDA) credit of 585 million units of Special Drawing Rights (SDR), which is equivalent to US$78 million spread over 7 years and repayable over 20 years. Seventeen agricultural research institutes and the Federal Institute of Industrial Research will benefit from the project. The project would represent the first stage of a long-term process to develop an institutional framework and improve research management systems, so that priorities are properly assigned and research planned and programmed efficiently. The project is aimed at rehabilitating the research institutes, and focuses support on high-priority research to increase the availability of appropriate technologies. With the injection of the World Bank loan, the Forestry Research Institute of Nigeria has the unique opportunity to rehabilitate and replace dilapidated and out-dated research equipment, purchase utility vehicles for much needed mobility, and resuscitate manpower development programmes.

CONCLUSION

Ideally, the budget for forestry research would be calculated after the research programmes were established. It would consist of the cumulative amounts necessary to undertake all the research projects that, after careful evaluation, had been found to be of sufficient merit for inclusion in the national plan (Arnon 1975). In Nigeria, this approach is rarely, if ever, possible to adopt. As a rule, the total costs of all desirable projects exceed the available resources. Therefore, the normal procedure is first to establish the forestry research budget and then to plan the research programme within the constraints imposed by the budget. In essence, what is eventually released for forestry research activities is invariably short of approved budget, which is usually in the order of 10% of the proposed budget for forestry research. This phenomenon severely limits the scope of forestry research activities, leads to frustration of research staff, and weakening of the forestry research infrastructure. It is concluded that urgent efforts should be made to:

1. considerably improve the levels of federal and non-federal funding for forestry research;
2. lay more emphasis on revenue yielding projects to generate additional funds from sales, fees, and consultancies;
3. intensify efforts in attracting national projects that are funded separately from the normal budget;
4. intensify efforts in attracting bilateral and multilateral aid agency funding of forestry research projects primarily to address the issue of strengthening forestry research infrastructure.

REFERENCES


SESSION TWO: PRIORITY SETTING AND FUNDING OF RESEARCH


