A Self-learning Course

# Planning and Managing Forestry Research
Volume II

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Module 3
## Identifying Key Issues for Forestry Research

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## Producing and Disseminating the Strategic Plan

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## PLANNING AND MANAGING FORESTRY RESEARCH: A SELF-LEARNING COURSE

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**Planning and Managing Forestry Research**
A Self-learning Course

# Module 2
# Initial Steps in Strategic Planning

# MODULE 2

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# Initial Steps in Strategic Planning

**O**ur world today is characterized by rapidly changing human needs, resources, markets, and social, political, and economic conditions. An important impact of these dramatic changes is that the sustainable management of forest and related resources has become increasingly more complex and difficult. Research needs are acute, and many pressing and important questions must be addressed. National or international forestry research institutions thus play a key role in helping to attain sustainable development of forests and their associated resources. In fact, forestry research has already made important contributions to the sustainable development of forest resources around the world.

In order for forestry research organizations to effectively meet the crucially important research needs of the future, they must have a coherent, unified view of their organizational mission, goals, and direction. To achieve such an organizational vision, research organizations utilize a process called *strategic planning,* defined as "...a disciplined effort to produce fundamental decisions and actions that shape and guide what an organization ... is, what it does, and why it does it" (Bryson 1988).

This important module will explore the concept and particulars of strategic planning, what it is, how it is done, and what it can do for your organization. By completing each unit and the exercises we have prepared, you will develop a background that will help you initiate strategic planning specifically for your organization. Along the way, you'll learn how forestry research organizations have already contributed to the sustainable development of forest resources, important information you can use when defending funding requests. We'll also explore the elements of the strategic planning process, and you'll learn how organizational mandates, stakeholders, and policy makers affect forestry research agenda setting. Finally, you'll prepare a mission statement for your own organization which incorporates these various elements.

# Skill & Knowledge Assessment

## Module 2 - Initial Steps in Strategic Planning



*If you would like to find out how much you improve your skills and knowledge by studying this module, we suggest that you complete the exercise on the next page 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 module 2. These are identical to those listed for this module in Study Unit 0.3 - Self-assessment of Training Needs, which you may have completed 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.*

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 <u>with assistance from others.</u>*
4  *I can perform the skill or express the knowledge <u>without assistance from others.</u>*
5  *I can perform the skill or express the knowledge <u>well enough to instruct others.</u>*

| Skill or Knowledge Statement | Your Level of Skill or Knowledge | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| a) Describe the role of strategic planning in a forestry research organization, and discuss some of its major advantages and limitations. | | | | | |
| b) Identify the key elements of a strategic plan for a forestry research organization. | | | | | |
| c) Outline a procedure for developing and updating a strategic plan for your research organization . | | | | | |
| d) Identify key formal and informal organizational mandates that influence the activities of your research organization. | | | | | |
| e) Conduct a stakeholder analysis to be used in developing a strategic plan for your research organization. | | | | | |
| f) Identify specific contributions forestry research has made or potentially could make to sustainable development in your own country. | | | | | |
| g) Explain why it is important to obtain input from policy makers when developing a strategic plan for your research organization. | | | | | |
| h) Describe the importance and role of a mission statement in a forestry research organization. | | | | | |
| i) Formulate a research mission statement for your research organization. | | | | | |

# Developing a Strategic Planning Process

**S**trategic planning is essential for research organizations to understand where they are, where they are going, and to determine how to get there. Among other benefits, strategic planning helps research organizations to define their overall sense of direction, and contributes to organizational unity, coherence, and performance.

In this unit we'll take a broad look at strategic planning. We'll explore why strategic planning is so important to forestry research organizations, and we'll identify some of the most important elements central to the process. You'll learn how to initiate the planning effort, and we'll provide guidance on some of the preliminary steps you'll need to take. Most importantly, by completing the exercises you'll begin to develop your own procedure for developing of a strategic plan for your organization.

## What Is Strategic Research Planning?

Strategic research planning is concerned with developing the mission and direction of a research organization (where are we going?) and broad strategies for accomplishing the mission (how do we get there?). To be successful, strategic planning must confront difficult choices, set broad priorities, envision the organization's future, and develop procedures to achieve that future (Pfeiffer et al. 1989). The time frame is long-term, from five to ten years or longer in some cases. Strategic planning is the responsibility of senior research management.

Strategic planning differs from long-range planning in that it: (1) focuses more on identifying, managing, and resolving issues; (2) emphasizes assessment of the environment outside and inside the organization to a much greater extent; (3) is concerned more with the "vision of success" of the research organization and how to

achieve it; and (4) anticipates and prepares the organization for future but unknown changes.

Long-range planning is usually based on historical projections, and does not work well when external conditions may be changing rapidly. Because it focuses on predicting future events, long-range planning tends to overlook the managers' potential role in creating the future (Hanna 1985).

## Why Is Strategic Planning Needed?

Research organizations need to respond quickly and effectively to changing circumstances. The external environment within which research organizations operate is often characterized by uncertainty and turbulence. Strategic planning helps to define an overall sense of direction and purpose for a research organization, and thereby helps managers respond to change. Hanna (1985) and Barry (1986) identify several potential contributions of strategic planning, including:

- providing direction, coherence, and unity to organizational efforts;
- improving organizational performance;
- introducing a discipline for long-term thinking;
- raising awareness about the external environment;
- enhancing the dialogue among managers on strategy;
- building teamwork and planning expertise; and
- stimulating forward thinking in the organization, especially among top managers.

This last point—stimulating forward thinking—is perhaps the most important contribution. Strategic planning is not an end in itself, but should be used to help research managers think and act strategically. Successful research organizations have always been guided by strategic thought and action, and a strategic planning process can aid in developing this perspective.

## The Strategic Planning Process

This section of the course provides a systematic approach to strategic research planning that can be: (1) adapted to the needs of a particular research organization; and (2) implemented by existing personnel at a reasonable cost and in a timely fashion. Worksheets that can be used by the planning team to facilitate the process are provided. The strategic planning process outlined below is adapted from Bryson (1988), Pfeiffer et al. (1989), and Barry (1986), and is depicted in figure 2.1.1. Each of the planning activities listed below is discussed in detail in the study units indicated.
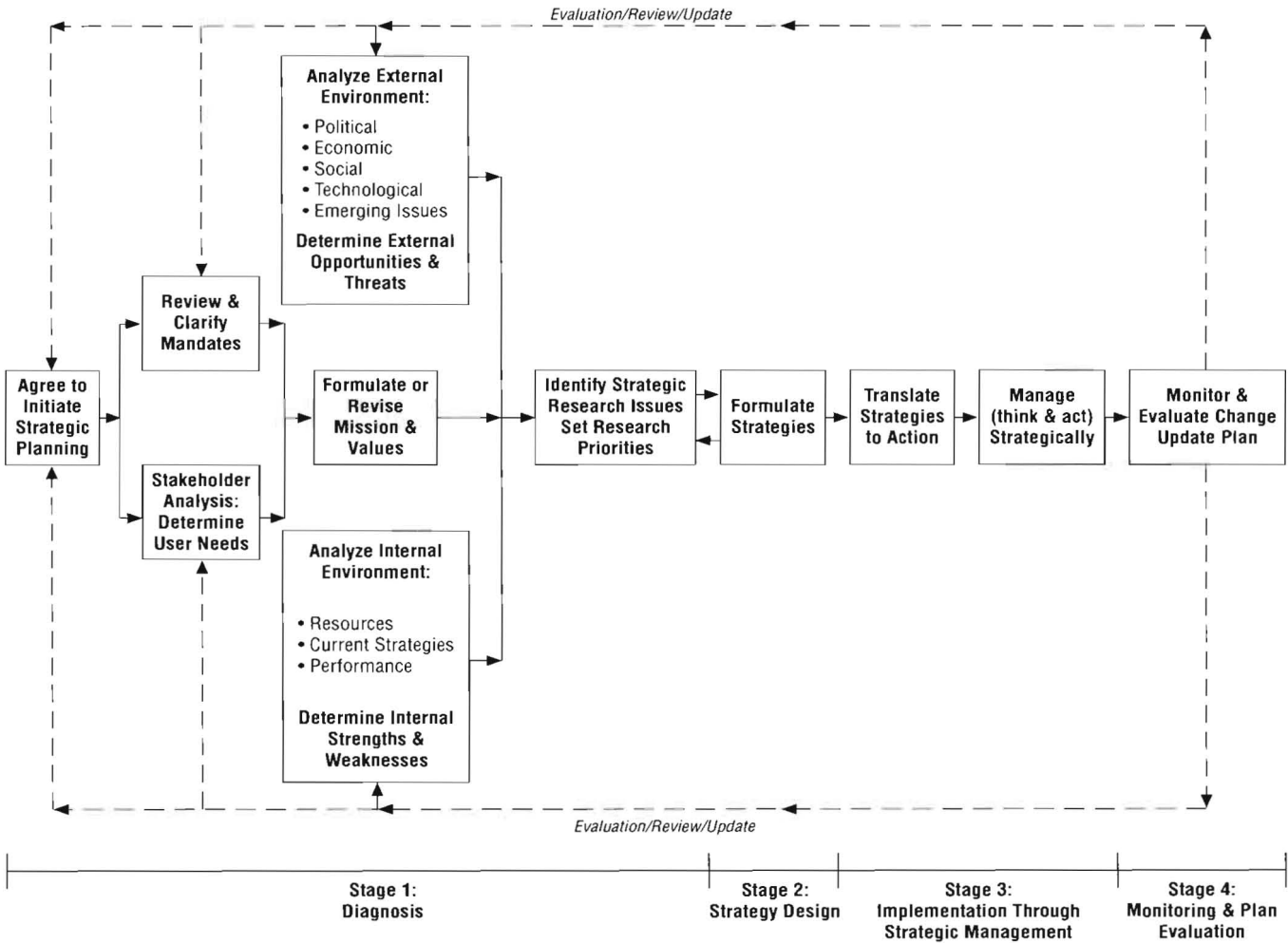
**Figure 2.1.1.** User-focused strategic planning model for forestry research organizations (adapted from Bryson 1988 and ISNAR 1990).

*Evaluation/Review/Update*

**Analyze External Environment:**

- Political
- Economic
- Social
- Technological
- Emerging Issues

**Determine External Opportunities & Threats**

**Agree to Initiate Strategic Planning**

**Review & Clarify Mandates**

**Stakeholder Analysis: Determine User Needs**

**Formulate or Revise Mission & Values**

**Analyze Internal Environment:**

- Resources
- Current Strategies
- Performance

**Determine Internal Strengths & Weaknesses**

**Identify Strategic Research Issues Set Research Priorities**

**Formulate Strategies**

**Translate Strategies to Action**

**Manage (think & act) Strategically**

**Monitor & Evaluate Change Update Plan**

*Evaluation/Review/Update*

**Stage 1: Diagnosis**

**Stage 2: Strategy Design**

**Stage 3: Implementation Through Strategic Management**

**Stage 4: Monitoring & Plan Evaluation**

## Stage 1: Diagnosis

- Initiating and agreeing on a strategic
  planning process.                                    Study Unit 2.1
- Identifying and clarifying organizational
  mandates.                                            Study Unit 2.2
- Conducting a stakeholder analysis.        Study Units 2.3, 2.4
- Developing a mission statement.                      Study Unit 2.5
- Assessing the external and internal
  environments.                                        Study Unit 3.3
- Identifying strategic issues.              Study Unit 3.4, 3.5

## Stage 2: Strategy Design

- Formulating strategies to manage
  strategic issues.                                    Study Unit 4.1

## Stage 3: Implementation Through Strategic Management

- Translate strategies to action          Study Units 4.3, 5.2
- Manage (think and act) strategically              Study Unit 5.3

## Stage 4: Monitoring and Plan Evaluation

- Monitor and evaluate change; update plan        Study Unit 4.4

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## Initiating and agreeing on a strategic planning process

The first step in strategic planning is to reach initial agreement
about the nature, purpose, and process of strategic planning. A
relatively small initial strategic planning group should be formed
to address the following important preliminary questions:

- Who will be on the strategic planning team?
- Who will oversee the effort?
- What are the potential benefits to the organization of strategic
  planning?
- What resources can be committed to the effort?
- What are the desired outcomes?
- What specific steps and time table should be followed?
- What should be the form and timing of reports?

This initial planning group should include the director and
representatives from top management of the forestry research
organization. Their involvement at this early stage of the strategic
planning process is important in specifying the desired output and
outlining the administrative framework within which the strategic
planning process is to be carried out. As indicated in the questions
above, a key decision to be made by this initial planning group is
who should be assigned the responsibility for the strategic
planning effort, and who should be appointed to the strategic
planning team.

The strategic team itself should include key research decision makers from within the organization, and perhaps involve input from some representatives of important external *stakeholder groups* (e.g., representatives from forest-based industries, conservation groups, government agencies that use research results, etc.). The process of identifying key stakeholder groups will be discussed in study unit 2.3. On the other hand, research managers may decide not to involve external stakeholders initially until they become more comfortable with strategic planning, since outside involvement will complicate the process. Representative research team leaders and scientists should be involved from the beginning. In small research organizations, the planning team may consist of only a few key individuals. In large organizations, two groups may be required to help ensure an effective planning effort: (1) a relatively large group to provide broad representation and legitimization of the planning process; and (2) a smaller executive committee that does most of the actual work and makes recommendations to the larger group. It should always be kept in mind, however, that strategic planning success depends to a large extent upon the initial and continued involvement of individuals that will be responsible for the plan's implementation.

Another key question that should be considered by the initial planning team is a process for monitoring and evaluating changes in internal and external conditions to determine the need for revising the strategic plan. Those preparing the strategic plan should be requested to include a section on a strategy for revision of the plan. This would include determining who or what position within the organization should be assigned the responsibility for implementing this strategy.

The activities following this discussion will help you answer the types of questions the initial planning group should address.

## Limitations of Strategic Planning

Strategic planning can be a powerful and practical tool in research, but it should not be oversold. Before undertaking the development of formal strategic plans for a forestry research organization, the limitations and potential pitfalls of strategic planning should be clearly recognized. Barry (1986) and Rocheteau (1989) discuss the following limitations:

**Costs can outweigh benefits.** Depending on the scope of the planning effort, strategic planning may be costly in terms of money and human resources, especially the scarce time and efforts of high level research managers. The potential benefits of strategic planning should be weighed against these costs. If the planning effort is ultimately unsuccessful or falls significantly

short of expectations, or if the resulting plan is not likely to be used, resources devoted to planning would be used more productively on other areas. The question, "Will the benefits of strategic planning outweigh the costs?" must be asked at the outset.

**Formal strategic planning may be unnecessary.** Some research organizations operate effectively by responding quickly to new opportunities and threats as they emerge, or "muddle along" without formal planning. A formal strategic plan may be unnecessary for small research organizations that operate effectively in this manner. In addition, some organizations have gifted leaders that instinctively think and manage strategically. Although such leadership is rare, organizations with unusually insightful and gifted leaders may not need to develop a formal strategic plan.

**Planning may become a bureaucratic exercise.** One of the main goals of strategic planning is to help research managers think and act strategically. But formal planning efforts sometimes become bureaucratic exercises that actually dampen initiative, creativity, and risk taking. Some planners may focus excessively on the planning process and neglect strategic thinking.

**Planning may be overemphasized.** The planning function is only one of the responsibilities of managers. Too much emphasis on planning may result in other vital areas being neglected. Development of a strategic plan should obviously be put aside when an organizational crisis develops, such as a severe cash shortage.

In the end, as usual, it is up to the research manager to weigh the benefits and costs of strategic planning and, if the anticipated benefits outweigh the costs, decide to what extent and how strategic planning is to be carried out.

## *Activities*

Strategic planning is a group effort. In order to begin strategic planning, you as research manager must first initiate and coordinate the process, and obtain the approval, tangible support, and a commitment of resources to the effort from top management. You must also ensure that all people involved in the activity agree on their perceptions of the planning process, the goals, and the expected outputs. Answering the following set of questions will help to organize a strategic planning process for your organization.

Assuming that you are responsible for developing a strategic plan for your research organization, answer the following questions as an aid to carrying out this task:

STUDY UNIT **ACTIVITIES**

## *Activity 1*

**What members of your own organization would you include on the strategic planning team?**

| Name | Position |
|------|----------|
|      |          |
|      |          |
|      |          |
|      |          |
|      |          |
|      |          |
|      |          |

*Comment 1*

Be sure to involve key research decision makers on the planning team. With small research organizations, the planning team may consist of only a few individuals from the research organization. Even with large organizations it is important to keep this core group small and thus more manageable. And be careful to include those key stakeholders in the overall planning process, even in modest research efforts! It may be necessary to establish several groups within the planning effort in order to ensure that all major stakeholders have a voice in the eventual outcome, and to legitimatize and improve the planning process. One group could provide for broad representation, and final approval of the strategic plan. A smaller executive committee or committees would do most of the work, and make recommendations to the larger committee for their review and consensual approval. Consensus decision making is normally required if strategic planning is to succeed since all parties must feel as though their point of view is valid and accounted for in the plan. Decision making approaches where participants can only "win" or "lose" rarely result in successfully implemented strategic plans.

*Activity 2*

Which key persons from other organizations might you wish to participate in some way in the overall strategic planning process?

| Name | Organization | Address/Telephone # |
|------|--------------|---------------------|
|      |              |                     |
|      |              |                     |
|      |              |                     |
|      |              |                     |
|      |              |                     |
|      |              |                     |
|      |              |                     |
|      |              |                     |
|      |              |                     |
|      |              |                     |
|      |              |                     |

STUDY UNIT **ACTIVITIES**

*Activity 3*

Who would be responsible for overseeing the strategic planning effort?

Planning Coordinator

Assistant

Assistant

## *Comment 2*

Be sure to include representatives of external groups or organizations important to your organization's research activities and implementation. For instance, this is an excellent opportunity for your organization to solicit the participation and input from representatives of forest-based industries, conservation groups, government agencies, and others that use your research results, and nongovernmental organizations through which the research may be implemented, etc. Conducting a stakeholder analysis in order to thoroughly assess the persons important to your organization is a good idea at this step (see Study Unit 2.3 for more detail on stakeholder analysis).

## *Comment 3*

The director of a research organization often serves as the chair of the strategic planning effort. In many cases, however, the director may delegate the actual administration and supervision of the planning process to another research manager. In all cases, however, the process should be facilitated by a person who is a good communicator, and who is familiar with strategic planning, group process and interaction, consensual decision management techniques, and the overall operations of the research program.

*Activity 4*

What potential benefits can your organization gain from strategic planning?

*List benefits:*

a.

b.

c.

d.

e.

*Activity 5*

What resources are needed to proceed with the planning effort? How would the planning team gain access to these resources?

| Resources Needed | Amount/type/person | Means for access |
|---|---|---|
| **Financial Resources** (amount) | | |
| | | |
| | | |
| **Personnel Resources** | | |
| | | |
| | | |
| **Support Personnel** | | |
| | | |
| **Other Needed Resources** | | |

## *Comment 4*

This a more individual question, with responses unique to your particular circumstances. However, we hope you listed some general benefits such as:

- defining the overall sense of direction and purpose for your organization;

- developing a set of thoughtfully defined research priorities; and

- improving your organization's ability to respond quickly and effectively to change.

Other benefits you may have listed could include:

- providing direction, coherence, and unity to your organization's efforts;

- improving overall research performance;

- introducing a discipline within your organization for long-term thinking;

- raising awareness about the external environment;

- enhancing the dialogue among managers on strategy;

- building teamwork and planning expertise; and

- stimulating forward thinking in your organization, particularly among top managers.

Did you list any others that we didn't think of?

## *Comment 5*

Again this a more individual question, with responses unique to your particular circumstances. To determine the resources you will need, you may want to conduct some initial brainstorming with your planning group. Probably some of the most important resources needed will be motivated personnel, time, perhaps some funding for the planning process and outputs, a place to meet, etc. Remember, attaining top management approval and support for the strategic planning effort is critically important for assuring access to these resources.

*Activity 6*

What are your desired outcomes? (That is, what do you hope to achieve by strategically planning your organization's future?) Be specific.

a.

b.

c.

d.

e.

f.

g.

h.

*Comment 6*

We expect your response will be unique to your situation. For instance, perhaps resolving constraints to research implementation, eliminating bottlenecks, improving efficiency and effectiveness of the research process, and improving your organization's relationships with its clients and key stakeholders are some of the outcomes or benefits to your organization. Or perhaps your staff will simply have a better view of the overall direction and mission of your organization, and will understand better their role in the research process.

## *Activity 7*

**What specific tasks or activities should be conducted to do strategic planning?**

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

6. _____

_____

7. _____

_____

## *Activity 8*

**How much time will you allocate for each phase of the strategic planning process? (Phases 1 to 7 listed above in your response to question 7)**

| Planning Phase | Amount of Time Allocated |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |

## *Comment 7*

To repeat from the text, the specific and essential activities necessary to conduct strategic planning are:

1.  Initiating and agreeing on a strategic planning process.
2.  Identifying and clarifying organizational mandates.
3.  Conducting a stakeholder analysis.
4.  Developing a mission statement.
5.  Assessing the external and internal environments.
6.  Identifying strategic issues.
7.  Formulating strategies to manage strategic issues.

You will need to keep these activities and their approximate order in mind throughout the strategic planning process.

## *Comment 8*

Developing a time plan, complete with time lines (see Study Unit 6.3) which note the timing of planning activities and completion dates, is essential when conducting strategic planning. Providing deadlines and limits on the amount of time spent on planning will help to focus the planning team's activities and priorities, and can make the entire strategic planning process more efficient and effective.

**What should be the form and timing of reports?**

## *Activity 9*

| Interim Report | Date Due | Person Responsible |
|---|---|---|
| _____ | \_\_\_\_\_ | _____ |
| _____ | \_\_\_\_\_ | _____ |
| _____ | \_\_\_\_\_ | _____ |
| _____ | \_\_\_\_\_ | _____ |

| Final Report | Date Due | Person Responsible |
|---|---|---|
| _____ | \_\_\_\_\_ | _____ |

*Comment 9*

Completing the strategic planning process by producing a final output or report is essential. Your planning team should, as a group, decide what form of reports would be most useful to meet their needs, and perhaps for other purposes (e.g., public relations, etc.). Reports must reflect the group's viewpoints and decisions. The group may also decide the most appropriate timing of the reporting process, with intermediate deadlines for first drafts, deadlines for review, and final dates for closure of the planning process.

*Congratulations on completing the study unit! You're now well on your way to understanding the strategic planning process and applying it to your own organization.*

STUDY UNIT **2.1**

*Summary*

Strategic planning is a crucially important planning process which can assist research organizations to define their overall sense of direction, and contribute to organizational unity, coherence, and performance. Simply put, it helps research organizations to understand what and where they are, and where they are going, and provides a structure for determining how to get there.

Strategic planning is a group process. Planning strategically includes a number of specific activities, including initiating the process, identifying and clarifying organizational mandates, conducting a stakeholder analysis, developing a mission statement, assessing the internal and external environments, identifying strategic issues, and formulating strategies to manage strategic issues. This study unit reviewed in detail how research managers can initiate the process of strategic planning in their own organizations.

If you would like more information about initiating the strategic planning process, we encourage you to obtain and review the interesting articles identified in the literature cited and other references listed at the end of the module. Two key articles directly related to the topics covered in the module, and cited in the text, are reprinted for your use in the section on readings at the end of the module.

# Identifying and Clarifying Organizational Mandates

## Objectives

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

- *identify key formal and informal organizational mandates that influence the activities of your research organization; and*

- *develop a procedure for reviewing your organization's mandates to identify key factors that may affect the research mission and the strategic research program.*

**A**n important early step in the strategic planning process is to identify and clarify the organizational mandates that govern the research organization's activities. Organizational mandates are those legislative actions (including laws and appropriations), governmental policies, administrative regulations, and other formal and informal agreements and understandings that define the rough boundaries of activities expected of the research organization. In order to clearly determine, as part of the strategic planning process, the present status and desired direction of their forestry research organization, research managers must first identify the organizational mandates affecting the research agenda, and then clarify how they impact the research organization's activities. Research managers should recognize that there are both formal and informal organizational mandates, both of which are important to the research organization, and should understand their role in setting the overall orientation and focus of the research agenda.

In this study unit, we'll help you to identify the formal and informal mandates which act upon your research organization. You'll learn why organizational mandates are important elements to be included in the strategic planning process. And you'll use a procedure which will help you to identify the organizational mandates which currently affect your own forestry research organization.

## Identifying and Clarifying Organizational Mandates

A clear statement of organizational mandates is one of the important inputs in developing a mission statement. Consideration should be given to formal governmental mandates, such as legal mandates and government policies, regulations, and appropriations. What is the research organization required to do under the laws and regulations formulated by the

legislative bodies and higher administrative levels of the government under which it operates? What is it allowed to do? What is it not permitted to do? Examples of formal mandates that influence research conducted by forestry research organizations are given in boxes 2.2.1 to 2.2.4. Formal mandates may include legislation, administrative regulations, together with formal contracts, agreements, and memoranda of understanding with other organizations, groups, and individuals, such as resource owners, timber companies, environmental groups, and other research organizations.

In addition, consideration also should be given to informal mandates (see box 2.2.2 for example), such as interest group reports, informal agreements and understandings with other organizations, etc., that may be no less binding.

All of these formal and informal mandates should be clearly stated and written down in the process of developing the strategic plan. By clarifying what is and is not ruled out by the mandates, the rough boundaries within which the organization may operate become clearer. This also gives others outside the organization a clear picture of some of the external factors that govern the development of your organization's research program.

The process for identifying organizational mandates is relatively straightforward. The strategic planning team (or several individual members) compiles a list of formal and informal mandates affecting the organization, and that influence its research program and activities. In doing this, the team may wish to seek help from more senior administrative levels of government, if the information they wish is not readily available. Next, the list of mandates is reviewed and modified by the entire planning team in order to clarify what the various mandates may imply for the organization's potential research mission.

In the process of identifying and clarifying mandates for your research organization, it may become evident that there is a need to change some mandates. Perhaps some mandates conflict with one another. Or perhaps some mandates that once were appropriate now are considered to be inappropriate for addressing high priority emerging issues. Some existing mandates may become barriers to desired changes in research programs.

**Box 2.2.1. Formal mandates of the Ecosystems Research and Development Bureau, Department of Environment and Natural Resources, Philippines.**

*Section 17 of Executive Order 192, by Corazon C. Aquino, President of the Philippines, dated 10 June 1987, outlined the following functions for the Ecosystems Research and Development Bureau:*

*"(a) Formulate and recommend an integrated research program relating to Philippine ecosystems and natural resources such as minerals, lands, forests, as holistic and interdisciplinary fields of inquiry;*

*(b) Assist the Secretary in determining a system of priorities for the allocation of resources to various technological research programs of the department;*

*(c) Provide technical assistance in the implementation and monitoring of the aforementioned research programs;*

*(d) Generate technologies and provide scientific assistance in the research and development of technologies relevant to the sustainable uses of Philippine ecosystems and natural resources;*

*(e) Assist the Secretary in the evaluation of the effectiveness of the implementation of the integrated research program.*

*The Ecosystems Research and Development Bureau shall directly manage and administer the FORI Research Offices, laboratories, and forest experiment stations located at UP Los Banos and such other field laboratories as the Secretary may assign to its direct supervision. The Bureau shall coordinate all technological researches undertaken by the field offices, access and translate all recommendable findings and disseminate such findings for all possible users and clientele."*

*Section 1 of the Department of Environment and Natural Resources (DENR) Administrative Order No. 44, Series of 1990, provides the following statement of policies and guidelines on the management of the DENR research and development system:*

*"It is the policy of the Department of Research and Development (R&D) activities shall be focused on the most urgent, high priority areas defined to ensure a more rationalized disposition and efficient utilization of the country's natural resources in consonance with the policy focus on ecological balance, ecosystems productivity, equity and social justice. Furthermore R&D shall also provide the necessary technological backstopping to push development forward in line with the government's desire to maintain the momentum of development in the Philippine economy."*

Since legislative and administrative mandates are usually imposed from outside the organization, the research organization itself may have little power to change them directly. However, the organization can call attention to the need for changes to those who do have the power to make such changes. This includes special interest groups who may want to see such changes brought about, and are willing to initiate and support proposals for changes in mandates.

### Box 2.2.2. Formal and informal mandates of the Forestry Research Institute of the Chinese Academy of Forestry.

*The Research Institute of Forestry (RIF) is one of nine research institutes within the Chinese Academy of Forestry, administered by The Ministry of Forestry. The RIF is a comprehensive forestry research institute, focusing on implementing major national and regional basic and applied research within China. The formal and informal mandates of the RIF are as follows:*

*FORMAL MANDATES:*
1) *to conduct major and interregional projects to solve the crucially serious scientific and technological issues related to forestry practice, focusing on basic applied research and applied research;*
2) *to seek suitable operational means to expand afforestation and reforestation, to improve forest management, and to enhance forest growth, and eventually to ensure the efficient and reasonable use of the limited forest resources, while developing the multi-effects of forests;*
3) *to implement research strategies of The Chinese Academy of Forestry (CAF) and to satisfy its developmental direction and goals, and then through CAF to provide The Ministry of Forestry with a scientific basis for formulating national forestry policies and strategies;*
4) *to carry out a wide range of forestry research in tree breeding and improvement, agriforest, economic forest, timber forest, shelterforest, sand-rehabilitation, afforestation techniques, forest management, biotechniques, exotic tree species, forest ecology, forest pedology, forest pathology, forest insects and tree mycorrhizae, etc., at both the national and international levels;*
5) *to develop international academic cooperation and exchange; and*
6) *to abide by all regulations and rules stipulated by the Academy.*

*INFORMAL MANDATES:*
1) *decision to train some scientists within the fields of forestry science through scientific research;*
2) *memoranda of understanding with local governmental organizations and NGOs for collaborative use of their lands for research;*
3) *collaborative relationships with other forestry research institutes within or beyond the academy;*
4) *distinctions between the existing activities, research priorities, and research territories of the Chinese Academy of Forestry and those of the Chinese Academy of Science;*
5) *decision to exchange scientific and technological information, publications, and researcher visits;*
6) *agreements with Academy or Ministry personnel on research priorities;*
7) *agreements with local NGOs and GOs on the extension and application of research results; and*
8) *decision to provide some support functions for the Chinese Society of Forestry.*

**Source:** *Personal communication by Wang Dong, Chinese Academy of Forestry, Beijing, P.R. China, December 1993.*

## Box 2.2.3. Mandate of the Forest Research Institute Malaysia (FRIM).

*"MANDATE. FRIM shall promote and improve the sustainable development of the forest resources and their industrial uses through research, development and application."*

**Source:** *SISTEM ARAHAN PENGURUSAN DAN PENTADBIRAN FRIM, Part A: Organisation and Research Management. 1 July 1993. Kuala Lumpur, Malaysia: FRIM.*

## Box 2.2.4. Formal mandates of the Desert Development Center (DDC), American University in Cairo, Egypt.

*"The mandates of DDC are:*
*A) to conduct research activities to promote the sustainable development of desert resources,*
*B) to determine suitable means to ensure the efficient use of these resources while restoring, protecting and enhancing basic productivity,*
*C) to conduct and report on a number of specific research projects in desert farming systems, water management, desert communities and allied fields, and*
*D) to disseminate proven research results and to train present and potential desert settlers."*

**Source:** *Draft document, "Strategies and Structure, Desert Development Center, American University in Cairo," received from Hosny El-Lakany, Director, December 1993.*

As part of the process of identifying and clarifying organizational mandates, the strategic planning team should consider the role of the forestry research organization in the forestry sector. Particular consideration should be given to national forest sector planning efforts in developing a master plan for the country, and to policy formulation related to forestry. The strategic plan being developed for your research organization should be integrated with the broad forestry planning efforts of the nation. It is important also to identify and consider the mandates and strategic plans of other organizations conducting research related to forestry within the country, and those international agencies that conduct and fund forestry research (for example, ICRAF and CIFOR) to recognize potentials for collaboration in research program areas, as well as potential areas of conflict.

*Please read the following situation description and answer the questions that follow.*

*Activities*

## Situation Analysis

*Imagine that your forestry research organization was established by national decree in 1967. You are required by law to conduct any research activities necessary to promote the sustainable development of your country's forest resources and to determine the most suitable means to ensure your nation's forest resources are used efficiently while protecting basic productivity. In addition, your organization is to provide the Ministry of Natural Resources with any research support they may need to implement their own forest development and watershed protection projects. You have held discussions with Ministry personnel, and have reached a consensus that high priority should be given to the installation and monitoring of water control structures in key watersheds to obtain baseline hydrologic data.*

*In addition, because of the excellent efforts and professional reputations of your scientific staff, your organization has attracted considerable funding from international sources which is specifically allocated to investigate the following:*

- *an investigation of the physical characteristics of wood of potentially commercial tree species;*
- *the socioeconomic adjustments indigenous forest inhabitants have been forced to make because of national resettlement schemes;*
- *the role of biological nitrogen fixation by leguminous trees planted in small holder agroforestry systems, and the biological sustainability of these farming systems; and*
- *the distribution and population status of indigenous palms.*

*Each of these particular research contracts have their own reporting timetables and requirements. In response to requests from several of your scientists, your organization has also entered into memorandums of understanding with several NGOs in your country in order to conduct some provenance and progeny test plantings on their lands. Finally, your organization has also established collaborative relationships with a number of forestry research organizations and working groups worldwide, including the International Union of Forestry Research Organizations (IUFRO), the International Center for Research on Agroforestry (ICRAF), the Food and Agriculture Organization of the United Nations (FAO), the International Institute of Tropical Agriculture (IITA), and the Nitrogen Fixing Tree Association (NFTA).*

## *Activity 1*

**What are the formal mandates for the research organization in this exercise?**

_____

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## *Activity 2*

**What are the informal mandates for the research organization in this exercise?**

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_____

The formal mandates for the forestry research organization in this example are listed below:

- to conduct research activities to promote the sustainable development of the nation's forest resources;

- to determine suitable means to ensure the efficient use of these forest resources, while protecting basic productivity;

- to provide the Ministry of Natural Resources with research support; and

- to conduct and report on forestry research which focuses on a number of specific research projects in wood technology, indigenous peoples, and the biological sciences.

A simple way to determine whether an organizational mandate is formal or informal is to determine whether money is involved. Normally, organizational mandates are formal if significant funding has been granted for research implementation. By accepting funding, the research organization explicitly or implicitly agrees to the requirements of the donor (an agreement which may also be accompanied by a contractual agreement). Informal mandates lack such formalized structures, and usually do not involve specific transfers of money. They are instead social in nature, and in that sense no less important than formal mandates.

Examples of informal mandates in this example would be:

- agreements with Ministry personnel on research priorities;

- memoranda of understanding with local NGOs for collaborative use of their lands for research; and

- collaborative relationships with forestry research organizations.

Did you think of any others?

## Activity 3

*List and briefly describe the formal mandates for your research organization (e.g., legal mandates, government policies, regulatory restrictions, funding appropriations restrictions, formal agreements with other organizations).* **That is, what are the boundaries of what your organization can and cannot do?**

## Activity 4

*List and briefly describe informal mandates for your research organization (e.g., agreements and understandings, interest group reports, social norms).*

Examples of formal mandates for your organization might be legislative or regulatory restrictions on the political, geographic, or problem domains within which your research organization can conduct research, or regulations which define your organization's role in the dissemination of research findings to research users. They also may include formal contracts or agreements with other organizations. Such restrictions may place boundaries on the kind of research one can do, the prospective clients for your research, and the degree to which you can become involved with the actual users of your research results.

Examples of informal mandates for your organization might be research suggestions and priorities arising from research advisory groups established by your organization, or from public participation in your research planning. Although they may not be formally binding, such research suggestions and priorities would have to be taken into account in developing your research program, and cannot lightly be disregarded. Thus, they would help to define the content of your organization's research program, and should be considered to be important informal mandates. Other informal mandates may include informal agreements with resource owners and managers, resource user groups, such as forest industry, and resource interest groups, such as environmental organizations.

## *Summary*

Organizational mandates define the rough boundaries of activities expected of the research organization. Mandates are both formal and informal. Formal mandates are the legal requirements, government policy, and appropriations which determine what the research organizations can and cannot do. Informal mandates, while less restrictive, are often no less binding in determining the research agenda. Informal mandates might consist of interest group reports, agreements and understandings with other organizations, social norms, etc. Exploring the role of organizational mandates in the formation and implementation of a research agenda is a relatively straightforward process. The mandates are first identified, and are then examined to determine what they allow, require, or restrict. A clear description of each mandate should be developed. This information can be used later to help formulate the mission statement.

If you would like more information about mandates, we encourage you to obtain and review the interesting articles identified in the literature cited and other references listed at the end of the module. Two key articles directly related to the topics covered in the module, and cited in the text, are reprinted for your use in the section on readings at the end of the module.

# Identifying Stakeholders and Their Concerns

## Objectives

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

• *identify key stakeholders to be considered in developing a strategic plan for your research organization; and*

• *conduct a stakeholder analysis to determine their concerns as they relate to your research organization.*

**A**critical activity in the strategic planning process is the identification of stakeholders and their needs. Satisfying key stakeholders is of utmost importance to the success of a research organization and its ability to generate financial and political support.

In this study unit, we'll introduce you to the concept of stakeholders, who they are, and why they are important. You'll use a simple analysis framework to help you assess the stakeholders that are important to your research organization. And you'll conduct a stakeholders analysis for your forestry research organization that you can use in your own strategic planning efforts.

## Conducting a Stakeholder Analysis

The next activity in the strategic planning process is to identify your organization's stakeholders and their concerns, and ensure that your research program addresses these concerns. *Stakeholders are defined as people, groups, or organizations that have a claim on the research organization's attention, resources, or output, or are affected by that output.* Examples of stakeholders for a research organization include public officials, governing bodies, a wide variety of interest groups (industry groups, conservation groups, etc.), extension agents and organizations, future generations, small farmers, taxpayers, other public and private research organizations within the country, research organizations in other countries, educational institutions, international donor and technical assistance agencies, and employees. There may be legislative or other legal requirements to include specific governmental offices, or representatives of particular groups or organizations in research planning activities.

Important employee groups should be explicitly identified as stakeholders. Scientists are perhaps the most important employee group, because their own satisfaction is vitally important to the success of a research organization. Moreover, scientists tend to judge organizational performance based on standards of scientific research, and it is the scientists who hold the organization to exacting scientific and professional standards to a greater extent than other stakeholder groups.

An important part of identifying stakeholders is to recognize the varying concerns that different groups of people may have in the outcomes of your research program. For example, it may be important to recognize the differing perceptions and concerns of women, compared to men. In the past, the important and often key role of women in the use of forests and related natural resources in many countries has been largely ignored or treated in a perfunctory manner. Women's groups, from the local to the national level, should be included in any list of potential stakeholders whose special concerns should be addressed by the strategic plan. Likewise, consideration should also be given to the special needs and concerns of religious and racial minority groups, such as indigenous people. Similarly, if special concerns arise regarding people in particular age, income, or other categories, these also should be considered in developing the strategic plan.

*Satisfaction of key stakeholders is crucial to the success of a research organization and its ability to generate financial and political support.* An organization that does not have a clear idea of who its stakeholders are, what they want from the organization, and how they judge the organization will have little chance of satisfying them.

A stakeholder analysis can be structured around the following questions:

- Who are the organization's stakeholders?
- What do they want from the research organization?
- What criteria do they use to evaluate the organization?
- How is the organization performing against those criteria?

The first question can likely be answered through a brainstorming session of the strategic planning team.

The second and third questions can be approached in two ways. One is for the planning team to make informed judgments about what stakeholders want and what evaluation criteria they use in judging the research organization. The second approach is to ask the stakeholders, through interviews or surveys, what their wants and criteria are. The first approach is obviously much faster and avoids any problems with stakeholders not being completely

honest. For example, an elected official may be concerned primarily with whether the performance of the research organization enhances re-election prospects, but would be unlikely to publicly state this criterion. However, caution is strongly advised when the planning team independently determines the stakeholder's needs and opinions, as they may be less knowledgeable of their stakeholders than they realize, and may make incorrect determinations. Thus, directly involving stakeholders in the analysis may be essential for accuracy and validity.

The fourth question to be answered in the stakeholder analysis concerns how well the organization performs against the stakeholders' criteria. For the purpose of prompting useful discussion on this question, it may be sufficient to indicate whether the organization's performance needs improvement, is acceptable, or is excellent relative to the various criteria. A suggested worksheet for conducting a stakeholder analysis is presented in the activities section of this study unit.

Once the planning team has completed the stakeholder analysis, it should serve as a basis for discussion of exactly how the various stakeholders influence the organization and which are the most important stakeholders It may be useful to order the stakeholders according to their importance to the organization.

To simplify the process of identifying stakeholders and their concerns, one can focus on seven key participant groups in the forestry research system (Lundgren 1990). Each of these research participants has different responsibilities and interests in forestry research. Table 2.3.1 lists these groups and summarizes their functions in the research system, which provide an indication of their primary concerns. Each group is described below in more detail.

**Table 2.3.1. Key participant groups and their functions in the forestry research system.**

| Key Participants in Forestry Research | Functions |
|---|---|
| Funders and Legislators | • Evaluate budget and funding requests for research programs<br>• Provide funds for research |
| Higher-level Administrators and Policy Makers | • Prepare and justify budget requests<br>• Administer laws, regulations<br>• Allocate appropriations |
| Research Managers | • Plan and manage research programs<br>• Prepare and justify budget requests for specific research projects, programs, activities |
| Research Scientists | • Plan and do research<br>• Disseminate research findings |
| Research Disseminators | • Disseminate new knowledge and technologies resulting from research<br>• Provide feedback from users to scientists |
| Users of Research Results | • Adopt and adapt research results<br>• Implement new technologies |
| General Public | • Receive wanted and unwanted effects from the use of research results<br>• Affect funding decisions |

**Research funders and legislators** are responsible for judging the relative merits of proposed forestry research programs and activities in relation to all of the other economic and social activities that might be funded. They evaluate budget requests in terms of the role that forestry and forestry research plays in meeting national goals or objectives. They also establish broad research goals and direction, provide funds for research, and establish the legal framework within which research must operate.

**Higher-level administrators and policy makers** within government agencies conducting forestry research are responsible for broad program direction and the strategic aspects of forestry and forestry research, but are not concerned with the narrow technical operational aspects of research. They are concerned with deciding what should be done (not how it should be done), with setting organizational goals, with developing external relations with important interest groups, and with achieving political support. They prepare and justify budget requests, administer laws, establish regulations, and allocate appropriations.

**Research managers** are responsible for planning how to achieve the broader goals set by higher administrative levels and for managing research activities. They are concerned with organizing the resources available to them, using them effectively and efficiently, supervising and training employees to make the most effective use of their talents, developing budgets for proposed research activities, and justifying proposed programs of research, among other things.

**Research scientists** are responsible for planning the more technical and operational aspects of research and conducting the research. They are concerned with selecting the problems for research, determining how the research is to be carried out, how experiments will be conducted, how data will be analyzed, and how the results will be presented and disseminated in order to meet scientific standards. They also are concerned with obtaining peer support and approval of their own proposed, ongoing, and completed research.

**Research disseminators,** both within the organization and outside of the organization, are responsible for disseminating research results and information to the various audiences, including scientists, users, and the general public. This includes verifying the scientific validity of the research results, interpreting them for the various audiences, and presenting them in a readily understandable form. This may include publications, training and education, or other forms of dissemination. For further discussion on research dissemination and disseminators see module 12.

**Research users** are responsible for the ultimate use and adoption of research results and the implementation of new technologies. They are primarily concerned with obtaining the best information available to assist them in implementing development projects and programs and other activities. They are concerned with how the research being planned and conducted is likely to meet their particular needs, and how the adoption of new or proposed technologies or other research findings will support or disrupt existing operations. Special attention should be given to the particular needs of women, minorities, and other groups that may have been overlooked in the past.

**The general public** are the ultimate source of much funding for research programs, and are concerned about how research will affect their lives. Their perceptions of how forestry research is affecting or could affect their lives may affect the actions they take to influence policies and appropriations for forestry research. Some may form special interest groups to take their concerns to funders and legislators, and attempt to influence the direction and extent of research programs. Others may be affected directly or

indirectly by the results of forestry research, but not be aware of this connection, or not take an active role in trying to affect the forestry research program.

Each of these groups could be analyzed in more detail to highlight the key concerns of particularly important individuals, groups, or organizations. However, the key stakeholder groups listed above are not a set of inflexible categories. They are only meant to suggest the broad range of interests that should be considered in developing a set of stakeholder groups that are of special concern to a particular research organization, operating within its own unique situation. In developing a strategic plan, each organization must identify and define its own categories of key stakeholders that are appropriate to its needs.

It may not be possible to consider and analyze all of the potential stakeholders of a forestry research organization, or to include representatives from all of the groups in activities to help develop a strategic plan. However, it is essential that the concerns of the principal stakeholders should be taken into consideration in formulating the research organization's strategic research plan.

## *Activities*

*Again, imagine you are the manager of the forestry research organization described in the Activities for Study Unit 2.2. Please review the situation analysis and respond to the questions utilizing the worksheet provided below.*

## *Activity 1*

**Conduct a stakeholder analysis for this hypothetical research organization and determine who are the important stakeholders in this forestry research organization (FRO).**
*Use a separate piece of paper for more space to write.*

| Stakeholders | What do they want from the FRO? | Criteria they use to evaluate the FRO's performance | According to these criteria, how is the FRO performing? |
|---|---|---|---|
| 1. | • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • |
| 2 | • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • |
| 3. | • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • |
| 4. | • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • |
| 5. | • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • |

*Comment 1*

| Stakeholder | What do they want from the FRO? | Criteria they use to evaluate the FRO's performance | According to these criteria, how is the FRO performing? |
|---|---|---|---|
| 1. National government | • Research for sustainable forest development<br>• Focus on resource use with protection<br>• Problem solving | • Reports<br>• Feedback from other agencies and citizens<br>• Publications<br>•<br>• | • Unknown in this example<br>•<br>•<br>• |
| 2. Ministry of Natural Resources | • Applied research support<br>• | • Useful results<br>• Relevant research<br>• Publications | • Unknown in this example<br>• |
| 3. International research donor organizations | • Specific research activities<br>• Reports and results<br>•<br>•<br>• | • Progress reports<br>• Evaluations<br>• Publications<br>• Useful results<br>• Well-conducted studies | • Unknown in this example<br>•<br>•<br>•<br>• |
| 4. NGOs | • Applied research support<br>• Collaboration with scientists and technicians | • Useful results<br>• Publications<br>• Relevant research<br>• Frequent collaboration<br>•<br>•<br>• | • Unknown in this example<br>•<br>•<br>• |
| 5. International forestry research organizations | • Participation<br>• Contribution to the scientific literature<br>•<br>•<br>• | • Frequency and quality of participation<br>• Quantity and quality of scientific papers<br>• Publications | • Unknown in this example<br>•<br>•<br>• |

You may have included a number of other stakeholders as well. For instance, private citizens, future generations, extension agents and organizations, educational organizations, small farmers, taxpayers, and employees and employee groups are all typical stakeholders that affect forestry research organizations to a greater or lesser extent depending on the circumstances.

## *Activity 2*

Conduct a stakeholder analysis and determine who are the important stakeholders in your forestry research organization (FRO)? (IMPORTANT: Prior to filling in this form, take a moment to make one or more copies of it in case you will need more space to thoroughly analyze your stakeholders.)

| Your Organization's Stakeholders | What do they want from your FRO? | Criteria they use to evaluate your FRO's performance | According to these criteria, how is your FRO performing? |
|---|---|---|---|
| 1. | • <br> • <br> • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • <br> • <br> • |
| 2 | • <br> • <br> • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • <br> • <br> • |
| 3. | • <br> • <br> • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • <br> • <br> • |
| 4. | • <br> • <br> • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • <br> • <br> • |
| 5. | • <br> • <br> • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • <br> • <br> • | • <br> • <br> • <br> • <br> • <br> • <br> • |

*Comment 2*

We can't really anticipate how you will respond to this question, as each organization is different. However, you will most likely include many of the same categories mentioned in the response to question 1. Be thorough to be sure that you and your staff have analyzed the stakeholders and their requirements very carefully. Successful strategic planning is crucially dependent upon a thorough and accurate stakeholder analysis.

You can use the last column as a tool to evaluate how well your organization is meeting the needs and requirements of your stakeholders.

We hope you are now comfortable with the concept of stakeholders, the process of stakeholder analysis, and with the importance of addressing stakeholders requirements in strategic planning. If you need more information about stakeholders, we encourage you to obtain and review the interesting articles identified at the end of this study unit, and found in the companion reference volume to this course.

## *Summary*

This unit focuses on the critically important step in strategic planning that identifies key stakeholders and their concerns as they relate to the forestry research organization. Stakeholders are defined as people, groups, or organizations that have a claim on the research organization's attention, resources, or output, or are affected by that output. Examples of stakeholders for a research organization include public officials, governing bodies, interest groups, extension agents and organizations, future generations, small farmers, taxpayers, other public and private research organizations within the country, research organizations in other countries, educational institutions, international donor and technical assistance agencies, and employees and employee groups.

The key to the success of a research organization and its ability to generate financial and political support is the satisfaction of key stakeholders. This study unit provided a framework within which to identify your organization's stakeholders and their requirements. Since this is a critically important aspect of strategic planning, and of research management in general, we encourage you to explore the subject further in the references identified in the literature cited and other references listed at the end of the module. Two key articles directly related to the topics covered in the module, and cited in the text, are reprinted for your use in the section on readings at the end of the module.

# Addressing the Concerns of Policy Makers

## Objectives

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

- *describe ways in which forestry research can contribute to sustainable development of a country;*

- *identify specific contributions forestry research has made or potentially could make to sustainable development in your own country;*

- *explain why it is important to obtain input from policy makers when developing a strategic plan for your research organization; and*

- *identify key concerns relating to forestry research for specific policy makers in your country, and incorporate these into your organization's strategic plan for research.*

**N**ational forestry research systems play a key role in helping their countries achieve sustainable development by creating, adapting, and implementing new technologies to meet changing needs, resources, markets, and social and other conditions. Investments in forestry research can yield high rates of return that are broadly distributed throughout society. Without a doubt, forestry research conducted in many countries worldwide has made important contributions to the sustainable development of those countries.

But in order to contribute to a nation's development, research organizations must secure sustained political commitments in order to implement a sustained research effort. A lack of political support inevitably leads to inadequate and unstable funding. Thus, public relations and building political support are key functions of research managers which can be achieved by improving relations and communication between your research organization and policy makers, and the public. To do this, you must identify the stakeholder concerns of key policy makers and show them how your proposed research program can contribute to solving the problems that are high on their agenda. This should be part of your strategic plan, which can then be used to win their support.

This is an important subject, for without public policy makers' support, even the best designed research program or strategic plan will languish from insufficient funding. By completing this unit, you'll gain a better understanding and appreciation of the importance of building a strong, positive, pro-active relationship with policy makers, clients, and the general public. We'll provide you with tips on how you can better identify and address the concerns of policy makers. And by learning more about the quantitative and qualitative benefits derived from forestry research conducted in both your own country and around the world, you'll be better equipped to justify and defend your research program and funding before national policy makers and funding agencies.

## Addressing the Concerns of Policy Makers

Forestry research organizations can become more effective in competing for funds in the public arena, if they consider policy makers as key stakeholders and ensure that their research programs address important issues of concern to policy makers and to society and are relevant to national development goals. Box 2.4.1. provides an example of stakeholders and their concerns for the Desert Development Center, American University in Cairo.

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### Box 2.4.1. Example of stakeholders and their concerns for the Desert Development Center, American University in Cairo, Egypt.

*Stakeholders and Their Concerns:*

*"The people, groups and organizations that have a claim on DDC's attention, resources or outputs, or are affected by that output may include: officials of the ministries of Agriculture and Land Reclamation, Public Works and Water Resources, Housing and New Communities, and Electricity and Energy; national and international research organizations; educational institutes; desert farmers and investors; NGO's; and DDC researchers, consultants and employees.*

*"The stakeholder concerns of key policy makers in Egypt include: the sustainability and conflicts over resource uses (e.g. restructuring international aid and investment patterns, and mounting worldwide environmental concerns), influence of socioeconomic trends on desert development and research (e.g. population growth and migration, returning expatriates and laborers, changes in technologies and markets, and new activities in the desert such as natural reserves and tourism), and complexity and interdisiplinarity of resource management (e.g. deterioration of resources and decline of environmental quality)."*

**Source:** *Draft document, "Strategies and Structure, Desert Development Center, American University in Cairo," received from Hosny El-Lakany, Director, December 1993.*

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Managers of forestry research organizations can strengthen their organization and gain important high-level support if they seek to play an active role in formulating policies related to forestry and forestry research. By getting to know the key players in policy formulation, and their concerns, research managers will become more visible and influential at the national level. They also are more likely to be able to ensure that their research programs address at least some of the key concerns of policy makers.

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## Important issues related to national development and forestry

In developing strategies for insuring that forestry research programs are relevant to national development goals, several important issues related to national development should be considered:

**Concern is growing about the sustainability of resource uses.**
As resource use pressures increase, and resource conditions
deteriorate, the long-term sustainability of many resource
utilization practices is in doubt. Grazing in arid regions is leading
to increased desertification; the shortening of fallow periods in
swidden agriculture to accommodate a growing population leads
to declining crop yields; the continued large-scale destruction of
tropical forest ecosystems depletes the stock of renewable
resources, threatens the extinction of irreplaceable ecosystems,
and contributes to a potential threat of global warming. Forestry
research can provide information that will help develop more
sustainable production systems to meet the growing needs of
people. Besides providing technical biophysical information about
how forest ecosystems and trees respond to management practices,
research also can assist in developing strategies for implementing
programs within local societies. An essential concern in forestry
research planning should be the long-term sustainability of
recommended management practices.

**Economic sectors are increasingly interrelated.** Forestry no
longer can be considered as an isolated economic sector within
national economies. It is increasingly influenced by and
influences policies and development programs in other sectors.
Agricultural pricing policies in international trade can lead to
tropical deforestation. Transportation planning can affect
sedimentation in watersheds, reduce the extent of bioreserves, and
lead to an influx of settlers with accompanying deforestation.
Those who plan and manage forestry research need to improve
their understanding of how forestry is affected by and affects other
sectors in society in order to evaluate forestry's place in society
and its potential contributions to national goals.

**International linkages are growing.** International trade
influences how natural resources are utilized. An increase in the
price of bananas may increase the rate of deforestation in tropical
developing countries as local farmers seek additional land to
expand their production of bananas. A ban on log exports in one
country may shift procurement to another. Restructuring of
multinational corporations, changes in international investment
patterns, and mounting worldwide environmental concerns, also
can influence how resources are used, and have implications for
forestry research. Expanding programs of international aid for
forestry research will directly affect forestry research programs,
both in magnitude and direction. Because of these increasing
international linkages, forestry programs can no longer be
considered solely from a national viewpoint. In planning forestry
research programs, the international linkages that could strongly

influence future directions of national forestry programs need to be identified and taken into account.

**Socioeconomic trends influence forestry and forestry research.** Populations grow and migrate, technologies change, markets change, new forest uses develop, old uses change. Forestry research must compete for funds with many other sectors of society, where new priorities emerge. Forestry research must keep abreast of changes that are likely to influence the management and use of forest resources. But it also must anticipate emerging issues and trends that are likely to influence research, and it must do so far enough in advance to develop, fund, and staff research programs to address these issues.

Decision making in forest resource management and use is increasingly oriented towards socioeconomic factors, rather than strictly technological factors. The growing emphasis in international forestry programs on helping rural people to solve problems such as shortages of fuelwood and fodder, illustrate a change in direction that some in forestry find difficult to cope with. Although improved technological information is needed, the primary challenge to forestry research in the future will be to find better ways of working with rural people to help them solve their problems while at the same time protecting and enhancing the natural resource base.

**Conflicts over resource use are increasing.** As populations grow, conflicts over resource uses increase. Expanding populations require increased food production. This often leads to the clearing of forested areas for agriculture, creating conflicts with land managers or other forest users. Such resource use conflicts often influence the direction of forest policy, thus affecting forestry programs and ultimately forestry research priorities. Solutions to resource use problems require skills in conflict resolution and an increased understanding of social and economic impacts of resource management decisions.

**Resource management is complex and interdisciplinary.** As use pressures on the forest base increase, as the resource deteriorates, and as the environmental quality declines, the job of management becomes increasingly complex. New ways must be found to produce goods and services needed by people while protecting the resource. Solutions to most resource-use problems move out of the purely technical realm into the socioeconomic-political arena. Solving such resource problems requires an array of interdisciplinary managerial and technical skills, including social science skills within forestry research organizations to improve understanding of these complex issues and their implications for forestry research.

These issues, of course, only illustrate some of the many critical forestry factors that may need to be considered in developing a strategic plan for a forestry research organization. It is important that any research program being developed identify at least some of the major forestry issues that are likely to be of concern to those who are being asked to provide funding and administrative support to the proposed program.

Box 2.4.2 gives examples of important trends that affect the research programs of the Forest Research Institute of Malaysia.

## Strategic issues important to forestry research organizations

In addition to issues related to development and forestry at the national level, several other strategic issues are important to forestry research organizations, including:

**Competing effectively for limited funds.** Forestry must compete for limited funds with a host of other economic and social sectors—agriculture, health, education, transportation, national defense—each with an endless array of critical needs. In almost all countries forestry research usually comprises only a small percentage of the forestry budget, or of the total scientific research budget. Because it is such a small percentage of the total national budget, it easily can be overlooked as being relatively insignificant in the total picture. Managers of forestry research must find ways to show how forestry research can contribute to forestry-related development activities. They also must help administrators show how forestry research can contribute to national economic development and human welfare, and to other economic sectors, in order to compete effectively with other sectors for funds. They must be able to demonstrate how forestry can contribute to meeting basic human needs, now and in the future.

**Understanding the setting of political agendas and policies.** To become more effective in the national arena, and more visible in national priorities, forestry research administrators and managers need to understand how political agendas and national policies are set so that they can contribute more effectively to the process. Many in forestry research management and administration began their careers as scientists within forestry research organizations, often as physical or biological scientists. Some may feel uncomfortable working in the political arena. Others may enjoy it. Regardless, forestry research managers must become more aware of how political agendas are set and decisions are made within their societies. Socioeconomic research can improve understanding of these processes and suggest how forestry can become more effective in influencing resource programs and policies.

## Box 2.4.2. Examples of trends and issues affecting forestry research programs of the Forest Research Institute Malaysia.

### *Programme 1: Silviculture and Management of Natural Forests.*

*"Forests were once considered as natural resources that are renewable and in surplus; the sector is now facing diminishing resource base with forests in deficit and inadequate resource replacement and development with forestry issues top the world environmental agenda. The subject of forests is related to the whole issues on environment, development and opportunities, including the development of sustainable forest management practices. Apart from its monetary value, forests in Malaysia play important roles in maintaining environmental stability, in minimizing damage to riverine ecosystem by erosion, in storing the germplasm of woody and non-woody resources, and in providing important sources of food, fuel and other materials to the needs of rural population. Therefore, Malaysian forests have always been regarded as of great importance to the nation, and prudent measures have been instituted to ensure the conservation and effective management and viability as a renewable and sustainable resource. The above scenario becomes the basis of research and developmental programmes and projects in FRIM."*

### *Programme 2: Sustainable Production of Non-timber Resources.*

*"The non-timber resources, especially bamboos and rattans, have not only been a part and parcel of the lives of rural people, but also, in recent times, a source of cash income at the individual level, and valuable foreign exchange at the national level. Over the last five years, rattans, bamboos and some pandanus species have become increasingly important in Malaysia. It is estimated that in Malaysia the rattan processing industries contribute about RM 10 million per year while the furniture export industries contribute about RM 17 million per year to the economy of the country. The importance of these non-timber resources has indeed been realized by the policy makers. Coupled with the gradual diminishing of supply sources from the natural forests, the situation, in the case of rattan, became critical enough for a ban on export of unprocessed rattan by Malaysia. This rather grim situation became a major driving force in the research and development programmes and projects in FRIM."*

### *Programme 3: Silviculture and Management of Plantation Forests.*

*"In Malaysia, the forestry sector is important in the national economy. For example, in 1991 it contributed about RM 2.83 million in revenues to the various states and about RM 8.85 billion in export earnings to the country. These contributions were mainly derived from logs resulting from harvesting activities in the permanent forest reserves and clearfelling activities of forest areas for agricultural crops. It is projected that the timber production in Malaysia will decline by the turn of the century. In view of this, forest plantations of fast-growing tree species as well as high quality timber species have an important role to play in the future, i.e. i) to supplement and to complement the timber supply from the natural forests, ii) to produce large volume of timber within a short gestation period, iii) to reclaim the degraded and poor sites such as tin tailing areas, and iv) to provide gainful employment opportunities for those living in rural areas. Thus, R and D on forest plantation activities, especially on silvicultural regimes, nursery practices and adequate supply of quality seeds need to be intensified in order to make plantation forestry a viable venture."*

**Source:** *Research Report 1992, Forest Research Institute Malaysia, Kuala Lumpur, Malaysia.*

**Publicizing contributions of forestry to national goals.** It isn't enough to know how forestry research and forestry can contribute to sustainable development, and how the political process works. Forestry research administrators and managers must make policy makers and political leaders more aware of the role of forestry in sustainable development, and convince them of the importance of forestry research and its potential contributions to the sustainable economic development of the nation. They also must be able to generate widespread public support for forestry programs and activities. Generating public support may require considerably more effort in widely publicizing forestry activities and their contributions throughout society, rather than concentrating primarily on scientific publications.

**Documenting contributions of forestry research to sustainable development.** If forestry research is to generate widespread support as an important element in sustainable development programs, it must identify and publicize the contributions that it can make to that development. Unfortunately, few quantitative evaluations have been made of the contributions of forestry research to development and conservation. This lack of solid evidence of forestry's contributions makes it more difficult to justify funding requirements of many forestry research organizations. While it is not possible in many countries to undertake such evaluations without importing experienced evaluation researchers, it is possible to: (1) put together some good specific qualitative examples of contributions and successes, and (2) call attention to quantitative and qualitative studies from other countries that indicate research successes in fields similar to the ones for which funding is being requested locally.

Fortunately, some quantitative evidence on the contributions of forestry research exists (see below). It is possible to provide a number of examples of contributions which can be used as support of funding and program requests to planning boards, finance ministries, and other groups that determine the budgets of forestry research organizations.

## Quantitative Evidence of Positive Economic Impacts of Forestry Research

Since much forestry research is similar to agricultural research, some indications of the economic contributions of forestry research can be drawn from the great volume of documentation on the value of agricultural research. Ruttan (1982) has summarized the results of this work (reproduced here as annex A, located at the end of this Module, and after Study Unit 2.5). The estimated economic returns to investment in agricultural research vary widely, but generally are high.

Studies of the economic rates of return to investment in forestry and forest products research are available, mainly for temperate countries. Results of various studies are summarized in table 2.4.1. As indicated, most of the estimated average rates of return are greater than 10 percent, and benefits exceed costs by more than 2 to 1.

### Table 2.4.1. Economic impact evaluations of forestry research.

| | | Measures of Economic Impact | | |
| | | | | Benefit/ |
| Study | Research Evaluated | Marginal ERR(%)[a] | Average ERR(%)[b] | Cost Ratio[c] |
|---|---|---|---|---|
| **Wood Products and Engineering Research** | | | | |
| 1. Bengston (1984) | Structural particleboard | 27-35 | 19-22 | |
| 2. Bengston (1985) | Lumber and wood products | | 34-40 | |
| 3. Haygreen et al. (1986) | Timber utilization | | 14-36 | |
| 4. Brunner & Strauss('87) | Wood preservation | | | 15/1 |
| 5. Seldon (1987) | Softwood plywood | 300+ | | |
| **Forest and Tree Management Research** | | | | |
| 6. Levenson (1984) | Tree improvement | | | 34/1 |
| 7. Bare & Loveless (1985) | Forest nutrition | | 9-12 | |
| 8. Chang (1985) | Growth and yield model | | | 16/1 |
| 9. Westgate (1986) | Containerized seedlings | | 37-111 | |
| 10. Pee (1977) | Rubber production | | 22 | |

[a]*Marginal economic rate of return, i.e., the ERR on additional funds invested.*

[b]*Average economic rate of return, i.e., the ERR on total investment; ranges given reflect different sets of assumptions.*

[c]*Benefit to cost ratio, when benefits and costs are both discounted back to a common point in time.*

There are many reasons to believe that societal returns to public investment in research related to tropical forestry will be at least as high as in the case of temperate forestry research. In fact, the one study available for the tropics (Pee 1977) produced a rate of return that was in the middle of the range of returns indicated for temperate forestry research. The estimated rate of return on investment in rubber research in Malaysia is 22 percent (Pee 1977).

Some argue that rates of return on investment in forestry research will be higher for the tropics, since the potentials for gains in such areas as species selection and breeding could be larger both

because of potentials for greater per unit biological gains in tropical environments and due to the existence of a larger human population that potentially could benefit from implementing and utilizing the results.[1] This argument is supported further if one accepts the parallels between forestry and agricultural research. The rates of return for agricultural research indicated in annex A are generally higher for developing (mainly tropical) countries than for developed countries.

Forest products and utilization research tend to be generic, and in most cases results are readily transferable from one environment to another with some adaptation. Thus, there is little reason to believe that rates of return on investment in such research would be any less for developing than for developed countries.

What can one conclude from the various studies that are available? The relatively high rates of return on investment in forestry research indicate that such investment has been productive. The average rates of return are higher for research than for investment in many other types of industrial, agricultural, and forestry activity.

## Other Impacts

There are many benefits derived from forestry research that go beyond traditional returns to research itself. One needs to keep these benefits in mind as additional reasons for establishing and supporting a strong forestry and forest products research capacity. For example, even if the basic technology a country needs can be imported, the country still needs research capacity to screen and adapt such technology.

> "A country without an indigenous scientific or technological capacity has no means of being aware of its own needs, nor of the opportunities existing in science and technology elsewhere, nor of the suitability of what is available for its own needs" (United Nations 1971).

This point is supported by Evenson and Binswanger (1978), who suggest: "A ...barrier to direct transfer is the frequent absence of research capacity at the applied level. As we have seen, there is a strong complementarity between the capacity for applied research and the ability to screen technology, and even direct transfer may

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[1] *We stress the fact that we are talking about economic rates of return to society and not financial rates or return based on market priced goods and services. Thus adoption of faster growing species by the rural poor to produce nonmarketed fuelwood and other goods and services for their own use would be included as benefits from society's point of view, even if such benefits do not show up directly in the market place.*

be difficult without the former." This point needs to be made quite strongly to those who fund and govern your research organization.

Some examples of the contributions of forestry research to economic development from many different sources around the world are provided in annex B (located at the end of this module, and after Study Unit 2.5). These serve to emphasize the basic point being made here: Forestry research has had significant beneficial economic, social, and environmental impacts that have affected human welfare. However, despite the work done to date, it is becoming increasingly obvious that forestry research has not been able to keep up with the needs and the expansion of activity involving tropical forest use.

*Activities*

Please read the hypothetical situation described below and answer the questions 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, 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. But she feels that since she sees other natural resource professionals, politicians, and upper-level policy makers at social functions several times a year, that should be enough. Again, she's a scientist, not a politician!*

*So Anita is nearly always surprised and disappointed that, despite her institution's excellent scientific performance, it nevertheless constantly (and unsuccessfully) struggles to acquire adequate funding to implement its research agenda. Her institution is, in fact, severely underfunded by the national government, particularly for core funding. She submits her budget each year and meets all the requirements and deadlines, yet is consistently told that financial resources are limited and that her planned programs must be curtailed. Yet, other programs within the government seem to be expanding in scope, at the same time her's is being cut. She feels that there is little support for forestry research in her country. Lately, she's even been considering applying to international organizations outside her country for core funding to support her research agenda. Anita feels that it's obvious that the major decision makers in her country are incapable of recognizing the importance of supporting forestry research.*

*Activity 1*

The following questions refer to the hypothetical situation posed above. For each multiple choice question, circle every choice that you feel is correct. **Why do you think that Anita's forestry research institution is not receiving adequate funding to implement its research program?**

a.  The forestry research is just not contributing to the national development of the country and thus does not deserve extensive financial support.

b.  Policy makers are simply not aware of the role forestry research is playing towards the sustainable development of forests and related resources.

c.  The research agenda set by Anita and her scientists is not meeting the needs of policy makers and citizens of her country.

d.  Important research results are not reaching potential users of the research, thus, the research program has little impact on the real problems facing those tasked with managing forests, and their users.

e.  No effort has been made to identify the forestry research program's benefits and contributions to the sustainable development of the country's forest resources and the national economy.

*Comment 1*

a. If the research agenda does not meet the needs of forest managers, users, and policy makers, it may in fact not contribute to sustainable forest development. If these people do not perceive forestry research as being relevant to their needs, they are unlikely to support the funding requests of the research organization.

b. Anita may in fact have a very relevant, useful program of forestry research. If, however, policy and decision makers, and potential users of the research never hear about the research results, the research program will not be seen as being useful and will not be well funded.

c. Without adequate input from the policy and decision makers regarding their perceived needs, the research agenda will probably not address these needs. And if the research program lacks relevance to policy and decision makers, they will not enthusiastically support funding requests.

d. Great research that is hidden away in scientific journals is of little use to policy and decision makers, forest managers, and users. Forest research organizations must make great efforts to ensure that their research is relevant to the needs of their clients, and is communicated to those clients through a variety of nontechnical channels. The subsequent public involvement and support will help to continuously refine the relevance of the research program, and will improve the chances of better funding support.

e. Managers of forestry research organizations need a measure of the benefits and contribution of their research to the sustainable development of their country. Studies or reports which specify these benefits (especially in economic terms) are powerful means of communicating the value of your institution's efforts to policy and decision makers in the language they understand. Such reports should be widely circulated for maximum impact.

*Activity 2*

**What is wrong with Anita's approach towards setting her institution's research agenda?**

a.  There is little input from outside her organization

b.  She doesn't attend enough social functions.

c.  It is largely oriented towards basic science, and does not successfully meet the needs of people trying to manage and utilize the forest, while at the same time protect the basic biological integrity of the forest.

d.  There is nothing wrong with Anita's approach. The problem is that policy and decision makers do not understand the value of basic biological research.

*Comment 2*

a. Since Anita makes little effort to obtain information from outside her institution, she is unlikely to be aware of other issues that may be more important than those she and her scientists have selected. This is a correct choice.

b. Not surprisingly, going to social functions is not the best way to gather essential information to use in setting a research program. Although some useful contacts are made at social gatherings, solely depending upon this as a means for enlisting support will most likely leave you, like Anita, without the strong support you need for your program.

c. Correct! Since only scientists are setting the research agenda in this case, chances are that the research program is not very useful to those in charge of managing or utilizing the forest resource. Incorporating a program of applied research that is specifically designed to address the expressed needs of these user groups will make the research results much more relevant and useful.

d. Sorry, the problem most likely lies with Anita and her management style. If policy and decision makers do not understand the value of basic research, it's because Anita has made little effort to help them understand.

*Activity 3*

**How can Anita improve her communication with policy makers, politicians and the public?**

a.  Attend more social functions.

b.  Be sure that a report is produced after each study is completed, stating the results in simple, nontechnical language, and detailing how these results will contribute to the sustainable development of the nation. Ensure the report is widely circulated among policy and decision makers.

c.  Develop a working relationship with policy and decision makers, getting to know them on personal terms, requesting their input from time to time, and keeping them in the communication loop, so that they remain informed of the organization's activities.

d.  Hold annual tours of the research facility, with scheduled presentations by scientists of their research results obtained from studies conducted during the previous year.

*Comment 3*

a.  Attending social functions can be an important means to develop informal communication channels.  Building social relationships with policy makers, politicians, and influential members of the general public is a crucial function of research managers.  However, when dealing with policy makers, it also is important to establish formal communication channels, and to utilize these channels frequently.

b.  This is a good idea which informs clients of the usefulness of your institution's program and efforts.  It also is an excellent means of bridging the gap between researchers and the users of the research.  However, if such reports are to be read by busy people, they should be brief and should stress the key points of the research accomplishments and their potential contributions to society and sustainable development concerns.

c.  Again, building formal and informal channels of communication with clients and policy and decision makers is crucial if support for your research agenda is to be obtained.  Research institutions that keep policy and decision makers well informed will have more relevant research programs, and will receive greater support at budget allocation time.

d.  While this can be a useful practice, if other formal and informal relationships and channels of communication are not established and frequently utilized, you may find few of the people you are trying to reach attending the open house!

*Activity 4*

**How can Anita improve the chances her organization will receive more adequate core funding in future years?**

a.  Improve her personal relationships with policy and decision makers.

b.  Keep these decision makers informed regarding the accomplishments of the forest research institution, and its contribution towards the sustainable development of the country.

c.  Simply demand more money, and threaten to quit if increased funding is not forthcoming.

d.  Include these decision makers in the research agenda-setting process, perhaps by inviting them to join a planning committee, ensuring that their needs will be on the research agenda.

e.  Begin applying outside the country for core funding, using the argument that her institution's research is critically important, an importance her own government is incapable of recognizing.

f.  Improve the research institution's relationship with the public, so that the public will consider outputs of the organization important and relevant to their needs.

*Comment 4*

a.  Absolutely!  Please see the responses to previous questions for further clarification.

b.  Positively!  Again, please see the responses to previous questions for further clarification.

c.  Not a very good idea, unless you don't really need or want your job!  Read over the responses to the other questions in this unit to find more positive methods for obtaining funding increases.

d.  A fine idea.  Encouraging participation in agenda setting will instill a sense of ownership, and will generate support for any future requests.

e.  While this is a good way to generate project (not core) funding, core funding must be long-term and dependable.  Too often, international programs are short-term and linked to political events outside your control.  Although it may be possible to secure fairly long-term funding through the careful development of bilateral donor arrangements, it must be recognized that you may have little influence over funding decisions made by such donors.  Such funding can disappear as quickly as it comes.  In all cases, a special effort should be made to focus on your own government to obtain the necessary core funds to sustain and support your forest research institution.  A strong commitment of core funding by your government is likely to attract project funding from outside donors.

f.  Public support is critical for generating political support of your programs. Remember, funding decisions are usually not made on scientific basis, but are instead political decisions, which usually correlate closely with the expressed needs of the public.

*Activity 5*

What are some of the qualitative contributions your organization has made to the sustainable development of your country's forest and watershed resources?

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*Activity 6*

What are some of the quantitative contributions your organization has made to the sustainable development of your country's forest and watershed resources?

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*Comment 5*

We can't easily predict how you will respond to this question. If you are having trouble formulating your answer, go back over the text and the responses to the other questions for ideas on the relevance of your forest research program to the national needs and the sustainable development of your country.

*Comment 6*

Quantitative contributions to sustainable development can be estimated by economic or financial analysis of the impact of your research organization's research outputs. If such studies are not available or are out-of-date, perhaps it is time to conduct a new study or studies quantifying the contributions forestry research has made to the sustainable development of your country.

*Activity 7*

Can you specifically identify the objectives of national policy makers as they relate to the use of forests and related resources in your country? To what extent does your organization's research agenda address these concerns, and the policy makers' views of national development? You might want to refer back to the stakeholder analysis you did in Study Unit **2.3.** *Use the format below to structure your response.*

Table 9

| Policy Maker Objectives | Your Organization's Research Activities Oriented to Meet these Objectives |
|---|---|
| • | • <br> • <br> • <br> • |
| • | • <br> • <br> • <br> • |
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| • | • <br> • <br> • <br> • |
| • | • <br> • <br> • <br> • |

*Comment 7*

You should by now better understand the importance of considering policy makers as key stakeholders. To answer this question, it is probably helpful to review the stakeholder analysis you conducted in Study Unit 2.3, where you listed the concerns and evaluation criteria of policy makers as they apply to your forestry research organization.

## *Summary*

Forestry research organizations play a key role in assisting with the sustainable development of forest resources in developing countries. Research institutions can develop, adapt, and facilitate the implementation of new technologies to meet changing needs, resources, markets, and social and other conditions present in the developing world.

Sustained political commitment is crucial to a sustained research effort. Meeting the public's needs is a primary concern of politicians everywhere. Forest research managers who neglect addressing the needs of the public, and thus of policy makers, run a great risk of losing political support and program funding. Thus, improving the relations and communication between your research organization and the public and policy makers and decision makers is crucial to the long-term effectiveness of your organization, and is your fundamental responsibility as a manager of research.

If you would like more information about addressing the concerns of policy makers in strategic planning, we encourage you to obtain and review the interesting articles identified in the literature cited and other references listed at the end of the module. Two key articles directly related to the topics covered in the module, and cited in the text, are reprinted for your use in the section on readings at the end of the module.

# Formulating a Research Mission Statement

## Objectives

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

- *describe the importance and role of a mission statement in a forestry research organization;*

- *formulate a research mission statement for your research organization that incorporates appropriate organizational mandates and the concerns of policy makers and other stakeholders; and*

- *utilize the stakeholder analysis process again to ensure that the mission statement for your research organization addresses the issues most important to key stakeholders.*

**A** mission statement is a clear and simple statement of what the organization is trying to accomplish through its activities. A well-conceived mission statement can be a valuable management tool, providing a guide for future direction of the organization and ·a basis for decision making. It can help to build a common awareness and understanding among employees as to where the organization is going, who it is serving, and what it is trying to do. It also fulfills an important public relations role by concisely communicating to stakeholders what the organization is all about. A mission statement ideally should serve as a "transformational guide" to what management wants the organization to be (Pfeiffer et al. 1989).

Unfortunately, many (if not most) forestry research organizations do not have mission statements, or if they do, they are not well publicized—they are noticeably absent from annual reports and other key documents. Formulating a mission statement for a research organization, and facilitating its use in organizational decision making, should be a primary task of the organization's top administrators.

This study unit will introduce you to the organizational mission statement, its importance, purpose, and use. You'll learn how to formulate a mission statement, and how to ensure that it reflects the real purpose and mission of your research organization. Though the formulation of a mission statement is a group activity, in order to help you to become familiar with the formulation process we'll ask you to create and evaluate a draft mission statement by yourself for your own organization, using the procedures presented in the unit.

## Developing a Mission Statement

An important task in developing a strategic plan for your research organization is to formulate a research mission statement. Because a mission statement provides a guide for future direction of an

organization, considerable time and effort should go into ensuring that it embodies the essence of the organization's future direction and activities, and provides a clear vision of the organization's goals and guiding principles.

By identifying clients and their concerns and research needs, the stakeholder analysis (step 3 in the strategic planning process) provides information that is useful in developing a mission statement. However, much more is needed. The mission statement should grow out of responses to the following questions:

- Who are we as an organization?
- What social needs do we exist to fill?
- What should our organization do to recognize or anticipate and respond to these needs?
- How should we respond to our key stakeholders and their concerns?
- What is our philosophy and what are our core values?
- What makes our organization distinctive or unique?

Thoughtfully addressing these questions and developing a mission statement that accurately incorporates a vision based on the values of the organization is a demanding process (Peters 1987). The strategic planning team should answer the questions individually first, and then come together as a group for discussion. Following the group discussion, the task of developing a draft mission statement for further discussion should be assigned to an individual or a small group. The draft mission statement should be discussed and modified as needed throughout the remainder of the strategic planning process.

Because a mission statement provides a guidepost for the organization, it is not enough to look only at what the organization is currently doing. It is even more important to try to establish a vision of what the organization should attempt to be in the future (Drucker 1986). If it is to be useful, the mission statement should be a relatively brief but clear statement that can be read quickly and be easily comprehended.

Box 2.5.1 provides an example of a mission statement from the Forest Research Institute Malaysia, and box 2.5.2 provides an example from the Desert Development Center, American University in Cairo, Egypt.

**Box 2.5.1. Mission statement for the Forest Research Institute Malaysia (FRIM).**

*"FRIM shall develop appropriate knowledge and technology for the conservation, management, development and utilization of forest resources; and shall pursue excellence in scientific research, development and technology transfer in the forestry sector. It shall attain leadership in tropical forestry research."*

**Source:** *SISTEM ARAHAN PENGURUSAN DAN PENTADBIRAN FRIM, Part A: Organisation and Research Management. 1 July 1993. Kuala Lumpur, Malaysia: FRIM. (page 12-1).*

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**Box 2.5.2. Example of a mission statement, from the Desert Development Center (DDC), American University in Cairo, Egypt.**

*Mission Statement:*

*The mission of DDC is "to improve the social and economic well-being of new desert settlers, through the use of research, training and related activities which integrate among agriculture, renewable energy and community aspects in order to achieve sustainability through increased productivity, profitability, diversity of output, and conservation of natural resources."*

**Source:** *Draft document, "Strategies and structure, Desert Development Center, American University in Cairo," received from Hosny El-Lakany, Director, December 1993.*

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Box 2.5.3 presents an example of a mission statement from the Forestry Canada-Newfoundland and Laborador Region forestry research establishment (Milne 1992).

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**Box 2.5.3. Mission statement for the Forestry Canada-Newfoundland and Laborador Region forestry research establishment (Milne 1992).**

*Mission Statement:*

*"The mission of For Can-NLR is to:*
*Enhance the economic, environmental, and social benefits from the forest resources in the region by:*

1.  *conducting world class research to produce scientific and technical knowledge on a wide range of forestry and environmental issues,*

2.  *promoting forest sector development through federal-provincial forestry agreements and related programs,*

3.  *disseminating scientific and technical information to meet client needs, and improving public awareness of forestry, and,*

4.  *providing strong scientific, technical, and policy advisory services."*

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Several regional forest experiment stations of the United States Forest Service, Department of Agriculture, and its national forest

products laboratory, have recently undertaken to prepare strategic plans. As part of this process they have prepared mission statements, examples of which are presented in box 2.5.4.

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### Box 2.5.4. Mission statements developed by research units of the Forest Service, United States Department of Agriculture.

*Mission Statement of the Forest Products Laboratory, Madison, Wisconsin:*

*"Our Mission is to improve the use of wood through science and technology, thereby contributing to the conservation and management of the forest resource."*

***Source:*** *Peterson 1992.*

*Mission Statement of the Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado:*

*"The mission of the Rocky Mountain Forest and Range Experiment Station is to conduct research, and to develop and communicate scientific information and technology that lead to better understanding of diverse ecological systems and their management. Our efforts focus on the central Rocky Mountains, Great Plains, and Southwest regions; however, the products of our research enhance the management, protection and use of natural resources world-wide."*

***Source:*** *Tinus 1992.*

*Mission Statement of the Pacific Northwest Research Station, Portland, Oregon:*

*"To serve society by improving understanding, use, and management of natural resources."*

***Source:*** *Moeller 1992.*

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*It should be clear that formulating a mission statement is a group process requiring a high degree of consensus. Conflicts may arise while attempting to achieve consensus over specific details in the draft mission statement. One way to deal with such conflicts is to broaden the mission statement so the details causing the conflict are eliminated.*

However, merely stating a vision in a formal mission statement is not enough. The only justifiable reason for expending the time and effort required to develop an appropriate mission statement is to provide long-term guidance to an organization. If a mission statement is to be effective it must be used and applied in research management. It should become the set of guiding principles by which the work of the organization is planned and judged at all levels. Research management, from the highest levels down, should use the principles contained in the statement in making decisions regarding future research directions and activities. Employees of the organization should all be aware of the mission statement, and research management's commitment to it.

Any mission statement should be periodically reviewed to determine if it is still appropriate for the organization. One sign that a mission statement is inappropriate or ineffective is when management makes decisions that have little or no relevance to the approved mission statement. If this occurs frequently, employees and other stakeholders will begin to assume that the mission statement is no longer relevant, and can be disregarded.

## Activities

*Carefully review the following mission statement taken from 1992*
*Strategic Plan of the International Centre For Research on Agroforestry*
*(ICRAF).*

*"To increase the social, economic, and nutritional well-being of peoples of*
*developing countries through the use of research and related activities to integrate*
*woody perennials in farming and related land-use systems in order to increase*
*productivity, profitability, sustainability, diversity of output, and the conservation of*
*natural resources."*

*To help you to better understand how mission statements are constructed and*
*formulated, please answer the following questions (the same questions mentioned*
*in the text of this study unit) regarding the ICRAF mission statement in the spaces*
*provided.* ***Base your answer solely on the mission statement provided above.***

STUDY UNIT **ACTIVITIES**

## Activity 1

**Who is ICRAF as an organization?**

STUDY UNIT **ACTIVITIES**

## Activity 2

**What social needs does ICRAF exist to fill?**

## *Comment 1*

Since the ICRAF Mission Statement emphasizes research and related activities to achieve its goals, ICRAF is clearly a research organization, presumably made up of researchers and scientists.

## *Comment 2*

ICRAF is clearly oriented towards "increasing the social, economic, and nutritional well-being of peoples in developing countries....". As an organization it attends to the social needs of peoples of developing countries through agroforestry research that will "increase productivity, profitability, sustainability, diversity of output, and the conservation of natural resources."

*Activity 3*

What does ICRAF plan to do to recognize or anticipate and respond to those needs?

_____

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*Activity 4*

How does ICRAF plan to respond to their key stakeholders?

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*Activity 5*

What is ICRAF's philosophy and what are ICRAF's core values?

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*Activity 6*

What makes ICRAF distinctive or unique as an organization?

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## *Comment 3*

According to their Mission Statement, ICRAF apparently concludes that by integrating woody perennials into farming systems, a variety of beneficial effects will be experienced by people utilizing these systems. Thus, ICRAF assumes that its activities address the needs of people, although it is not clear how the needs have been identified, or will be in the future.

## *Comment 4*

In this mission statement, it is not clear who the stakeholders are, other than "peoples of developing countries" (a rather broad group!), and by inference those people who manage "farming and related land-use systems." Thus, the key stakeholders are identified to some extent (farmers) though are not explicitly mentioned.

## *Comment 5*

ICRAF's overall philosophy is one of service via research, to "increase the social, economic, and nutritional well-being of peoples in developing countries...." While its core values are not explicitly stated, according to their Mission Statement, ICRAF seems to exist to promote wise and more productive use of land in developing countries for meeting human needs.

## *Comment 6*

Those familiar with ICRAF will know that the organization fills an important and unique service to the developing world in agroforestry research and technology transfer. However, the ICRAF Mission Statement sheds no light on the uniqueness or distinctiveness of the organization.

*Before you proceed with the rest of the exercises, we suggest that you read over this unit's Comments 1 to 6. Once you have done so, you should have a good idea of how mission statements are constructed, and what they mean. The next series of questions will ask you to prepare a rough mission statement for your own organization. Feel free to proceed once you're comfortable with the concepts underlying mission statements. Remember, normally a mission statement is formulated by a number of people working together, not by a single individual. The mission statement must reflect the group's view, not that of one particular person, and must be agreed upon by all. Thus, this exercise is to help you to become familiar with the process used to creating a mission statement, a process you can then use with your own organization's employees.*

*Activity 7*

Who are you as an organization?

*Activity 8*

What social needs does your organization exist to fill?

*Activity 9*

What is your organization doing to recognize or anticipate and respond to those needs?

*Activity 10*

How does your organization respond to your key stakeholders?

*Comment 7*

Try to determine the main function of your organization, its overall goals and objectives, its strategic issues. Keep asking the question "Why?" Why do we do what we do? Why do we exist as an organization? What is the overall sense of your organization's purpose.

*Comment 8*

Your organization exists to meet certain specialized needs of society. Can you determine and describe in a fundamental way what are those needs? Has your organization conducted a needs assessment of its clientele? Your organization needs a clear picture of the felt needs of society it is to address. In your needs assessment start out being specific, then gradually combine these social needs into overall broad categories which can be used in the mission statement.

*Comment 9*

Now that your organization's needs have been identified, how does your organization intend to meet those needs? Has your organization made a number of assumptions regarding the benefits of its research activities? Are those assumptions valid? Does your organization have procedures in place to identify emerging issues and needs and the flexibility to respond to those needs? Use these and other questions to guide your thinking in trying to define the main research activities that meet the social needs identified above.

*Comment 10*

First, who are your key stakeholders? As part of the overall process of strategic planning, you should first conduct a stakeholder analysis (see Study Unit 2.3) prior to preparing a mission statement. Once you have identified the key stakeholders and their needs, determine how your organization intends to address (or is addressing) these needs. Again, combine the key stakeholders into broad groups that can be included in the mission statement. Don't be too general, however, or the mission statement will lose focus and utility.

## *Activity 11*

**What are your organization's philosophy and core values?**

## *Activity 12*

**What makes your organization distinctive or unique?**

*Comment 11*

The philosophy of mission, and the associated core values of your organization can probably be generally described, and painted in broad strokes in the mission statement. Most research organizations are (or should be!) service-oriented, and attempt to advance science and extend our knowledge for specific purposes (i.e., improve the well-being of people, protect or enhance biological systems, etc.).

*Comment 12*

This question tries to determine the unique role your research organization may play either nationally or internationally (or both), in the advancement of science and knowledge. Is there a special niche your organization occupies that provides research services unattainable elsewhere? Including this information in a general way can be a valuable way to inform stakeholders, employees, and the public of the special nature of your organization.

Now that you have answered these questions regarding your own organization, try to piece together the most important portions of each response to formulate a mission statement that best describes the identity, stakeholders and their needs, its approach to address those needs, its philosophy and core values, and its distinctiveness. Keep at it by drafting and refining new versions until you are satisfied that the mission statement accurately addresses the reality of your organization.

*Write your final draft version of your mission statement below.*

## Mission Statement Validation

Once you have a draft mission statement with which you are satisfied, it is important to test it for validity and to ensure that it does accurately reflect your organization's characteristics and mission. You can do this by submitting the statement to your stakeholders to see if it adequately describes how they perceive your organization's purpose and function. You can also conduct role playing exercises within your organization, asking staff members to assume the roles of key stakeholders, and then to review the draft mission statement to see how it addresses the needs and evaluation criteria of these stakeholders.

## *Summary*

A mission statement is a clear and simple statement of what the organization is trying to accomplish through its activities. A well-conceived mission statement provides a guide for future direction of the organization, serves as a basis for decision making, helps to build a common awareness and understanding among employees as to where the organization is going, who it is serving, and what it is trying to do, and concisely communicates to stakeholders what the organization is all about. Formulating a mission statement for a research organization, evaluating its relevance, and facilitating its use in organizational decision making and communications should be a primary task of the organization's top administrators.

This study unit should have helped you to better understand the importance, purpose, and use of the organizational mission statement. You should also be more comfortable with the process by which mission statements are formulated and evaluated.

If you would like more information about mission statements and their formulation, we encourage you to obtain and review the interesting articles identified in the literature cited and other references listed at the end of the module. Two key articles directly related to the topics covered in the module, and cited in the text, are reprinted for your use in the section on readings at the end of the module.

# Skill & Knowledge Assessment

## Module 2 - Initial Steps in Strategic Planning

**Below are listed a number of skill and knowledge statements derived from the objectives of the study units in module 2. These are identical to those listed in the initial skill and knowledge assessment at the beginning of the module.**

*Now that you have completed module 2, 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 <u>with assistance from others.</u>*
4. *I can perform the skill or express the knowledge <u>without assistance from others.</u>*
5. *I can perform the skill or express the knowledge <u>well enough to instruct others.</u>*

| Skill or Knowledge Statement | Your Level of Skill or Knowledge | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| a) Describe the role of strategic planning in a forestry research organization, and discuss some of its major advantages and limitations. | | | | | |
| b) Identify the key elements of a strategic plan for a forestry research organization. | | | | | |
| c) Outline a procedure for developing and updating a strategic plan for your research organization . | | | | | |
| d) Identify key formal and informal organizational mandates that influence the activities of your research organization. | | | | | |
| e) Conduct a stakeholder analysis to be used in developing a strategic plan for your research organization. | | | | | |
| f) Identify specific contributions forestry research has made or potentially could make to sustainable development in your own country. | | | | | |
| g) Explain why it is important to obtain input from policy makers when developing a strategic plan for your research organization. | | | | | |
| h) Describe the importance and role of a mission statement in a forestry research organization. | | | | | |
| i) Formulate a research mission statement for your research organization. | | | | | |

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# ANNEXES

## ANNEX A.  STUDIES DOCUMENTING THE VALUE OF AGRICULTURAL RESEARCH

Rates of return from investment in agricultural research.

| Commodity or Innovation | Country | Average Annual IRR (percent) |
|---|---|---|
| Hybrid corn | USA | 34 – 40 |
| Hybrid sorghum | USA | 20 |
| Poultry | USA | 21 – 25 |
| Tomato harvester | USA | 16 – 46 |
| Aggregate agricultural research | USA | 34 – 51 |
| Rapeseed | Canada | 95 – 110 |
| Sugarcane | S. Africa | 40 |
| Wheat | Mexico | 90 |
| Maize | Mexico | 35 |
| Cotton | Brazil | 77 – 110 |
| Maize | Peru | 35 – 40 |
| Rice | Japan | 25 – 27 |
| Rice | Colombia | 60 – 82 |
| Soybeans | Colombia | 79 – 96 |
| Wheat | Colombia | 11 – 12 |
| Cotton | Colombia | Neg. |
| Wheat | Bolivia | -48 |
| **Median** | | **37.5** |

*Source:* Adapted from Ruttan, V. 1982. Agricultural research policy.
Minneapolis, MN: University of Minnesota Press. p. 242.

## ANNEX B

## EXAMPLES OF BENEFITS FROM FORESTRY RESEARCH

This annex provides some specific examples of benefits from research which can be used in arguing the case for research funding. The examples are taken from work done by the International Task Force on Forestry Research (1988) and Spears (1988). The examples are divided into five categories, to reflect five major areas of forestry related research.

### Benefits from Agroforestry and Watershed and Dryland Management Research

- Singh, Panday and Tiwari (1984) researched energy interrelationships for two Himalayan villages. They found that animals accounted for more than 70 percent of total energy input into the farming system. Beyond this, the animals themselves depended on the forest for 87 percent of their fodder. To sustain the existing system, more than five hectares of forest were needed per family, while the actual forest available was slightly over one hectare.

- Work by Flemming (1983) indicates that improved harvesting and management practices can increase significantly the yields from grass and forest grazing lands in Nepal. For example, the increase was from 1,200 to 6,000 kilograms per hectare per year for grasslands and from 3,000 to 6,000 kilograms per hectare per year for forest lands.

- Researchers have developed a method of predicting the influence of trees upon landslides (Hawley 1988). Reforestation can reduce shallow soil landsliding by at least 70 percent. The occurrence of landslides dramatically increased when forest areas were converted to pastures; over 60 percent of the converted areas had landslides. Productivity on these landslide areas was reduced by 20 percent to 30 percent for over 80 years following the landslides (Trustrum et al. 1984). This research did not follow the effects downstream—although research elsewhere suggests that landslides that occur into channels are major sources of sediment to downstream areas.

- Achlil (1984) reports 48 percent, 20 percent, and 17 percent reductions in peak monthly runoff, annual sediment transport, and peak monthly sediment transport, respectively, caused by improved farming, terracing, and tree planting in the Solo watershed on Java, Indonesia.

- Wiersum (1984) studied surface erosion rates under different agroforestry systems in Java, Indonesia. This led to better understanding of the role of trees, in combination with crops, in protecting the soil. Soil surface management was recommended—trees without soil conservation measures beneath them will not adequately control erosion.

- Openshaw (World Bank 1986a) summarizes the potential of improved management of natural savannah woodlands to contribute to tree fodder and fuelwood needs in the Sudan. Research has shown that, in many cases, application of simple management techniques, such as control of harvest and burning, can more than double sustainable outputs from less than one to two cubic meters per hectare per year (Winterbottom and Hazlewood 1987). Costs can be very low, creating cost-effective management opportunities. Similar results have been demonstrated for Niger and other countries.

- CATIE (Enriquez 1983) researched combinations of pasture and various tree species, such as *Cordia alliodora* and nitrogen-fixing *Erythrina poeppigaiana.* The presence of *Erythrina* resulted in a 70 percent increase in total grass and protein production. Other similar studies exist.

- Kang and Wilson (1987) have researched alley cropping in Nigeria, involving production of maize intercropped with rows of *Leucaena leucocephala.* Maize yields were consistently higher when *Leucaena* prunings were maintained on the fields. When nitrogen was added in addition to the prunings, yields increased even further.

- A well-documented case is the shelterbelt program in the Maijja valley of Niger. Use of windbreaks resulted in an average 17 percent increase in crop yield, despite the fact that land was taken out of crop production for growing the shelterbelts. In addition to the protection benefits, the shelterbelts provide fuelwood estimated at 52 cubic meters every four years per linear kilometer of windbreak, and fodder estimated at four tons every four years per linear kilometer of windbreak (Rorison and Dennison 1986; Long and Dennison 1986).

- Research by El-Lakany (1987) and others in Egypt has demonstrated yield increases as high as 47 percent for maize grown with windbreak protection. Protection benefits vary widely by crops.

- A shelterbelt research program in Nigeria was initiated in the 1970s under IDRC sponsorship. At the expiration of the IDRC project in 1984, the Nigerian government was so impressed by the results achieved and the effects of shelterbelt on agricultural yield, livestock production, and amelioration of the living conditions of the rural communities living in the immediate vicinity of the belts,

  that extrabudgetary funds have been provided to continue the research (personal communication, P. Kio).

- Farnsworth (1976) has researched the effects of shade or shelter trees and found that cattle with access to shelter gained 676 grammes per day, while the control group (without shade) only gained 472 grammes per day. Similarly, research has found that under high temperatures, milk yields increase when cattle have access to shade.

**Contributions of Research in the Area of Natural Tropical Forest Conservation and Management**

Examples of past research in these priority areas show the significant impacts that can be obtained:

- Winterbottom and Hazlewood (1987) have summarized research being undertaken in the Gusselbodi forest in Niger. This research has shown that simple, low-cost management techniques in the natural forest, such as early burning and careful timing of lopping and felling, can produce three cubic meters of fuelwood per hectare per year, or roughly six times the yield that is generally assumed for unmanaged forests. At the same time, a number of other products results (gums, fodder, medicines).

- Research by Anderson et al. (1987) documented the significant economic and ecological roles that the naturally occurring babassu palm (*Orbignya* spp.) plays in the Maranhao

state of Brazil. Some 64 percent of total cash and noncash income in three municipios of Maranhao came from babassu products during the peak harvest period of October to December. This has policy implications in terms of protection and management. Findings led to management guidelines for the palm areas.

- Based on his research, Repetto (1988) notes that nonwood forest products brought in US$120 million in 1982 in Indonesia. Most of the associated harvesting and production activity involved employment in local economies, whereas much of the wood export value was retained by timber companies as profits.

- Two major anticancer compounds were derived from the periwinkle plant, which only occurs naturally in Madagascar. With these drugs, there is now a 99 percent chance of remission in children suffering from lymphocytic leukaemia and a 58 percent chance of remission from Hodgkin's disease.

- Based on previous experiences in improving natural forests, gathered in several West African countries between 1945–65, CTFT and SO.DE.FOR started in 1976 a research program on different management systems on three types of forest of Cote d'Ivoire. In subsequent years this program was extended to Central African Republic and French Guyana. This long-term research work has already given some indications on the dynamics of tropical moist forest and early results on response to interventions such as thinning and selective logging. This research should lead in the future to simple silvicultural prescriptions applicable to large areas (personal communication C. Cossalter).

- Many otherwise obscure insect species in the tropics have major economic importance. For example, the oil palm *(Elaeis guineensis)* is pollinated in the wild in Africa by a weevil *(Elaeidobius kamerunicus)*. The oil palm was introduced in what is now Malaysia in 1917 without the weevil and thus required costly, inefficient hand pollination. In 1980-81 the pollinator was collected from its native habitat in the forests of the Cameroon and brought to Malaysia after a six month quarantine; significant improvement in pollination resulted, with the percentage of fruit set increasing by 8 to 28 percent. After considering other factors of production, it is estimated that the increase in national oil palm production could reach 12.3 percent (Salleh Mohd. Nor, personal communication). The improvement was worth some US$50 to US$60 million in foreign exchange in the first year alone (Goodland 1985).

- Research by Dourojeanni (1978 as cited in Falconer 1987) showed that in the Ucayali region of the Peruvian Amazon, some 85 percent of protein consumed came from wild game and fish. Similar results were obtained in a study of the forest from Botswana (Butynski and von Richter 1974).

**Contributions of Research in the Area of Tree Improvement and Tree Breeding Research**

Examples of past research include the following:

- FAOs project on genetic resources of the arid zones, focussing on woody species, is a worldwide effort. The initial eight countries involved collected seed, explored natural ranges of species (mainly Acacia and Prosopis species) conserved sands on site, evaluated materials, did field trials, and made seed available to other countries. Over the years 1980–87, a total of 281 well-documented seedlots (provenances) of 43 species were

explored, and seed distributed for testing and conservation. Work was undertaken in at least one institution in some 17 countries. The potential yield gains from use of results of this work are significant.

- Research has shown that great gains in productivity can be made simply by identifying and selecting the seed source most adapted to planting locality. In provenance trials in Nigeria with *E. camaldulensis*, the best provenance had a mean annual increment of 17.3 cubic meters per hectare, while the poorest only had 5.1 cubic meters (FAO 1979). In the Congo and Brazil, the yield of eucalyptus plantations has been increased by up to 80 percent by selection of the best seed sources (Chaperon 1978; Brune and Zobel 1981). FAO, CTFT, DANIDA, and other groups have established seed procurement systems around the world which aim at improved seed selection, exchange, and distribution.

- Panday (1982) has shown the great variation in production of dry matter (DM) in different fodder tree species, which in the Himalayan region varies from as low as 5 to 7 kilograms to as high as 50 to 70 kilograms annually per tree. There are significant implications in terms of tree selection and selection of provenances for given species.

- Research in India by Pathak and Patil (1982) found that the difference in forage production between the best and worst provenances of *Luecaena leucocephala* over a three-year period were around 70 percent.

- Much useful work on nitrogen-fixing trees has been done by various countries (Senegal, Egypt, China) and various groups including CTFT/ORSTOM, NFTA, IITA, FAO, and others. Dommergues (1987) indicates the importance of research in this area. Certain trees can fix significant amounts of nitrogen in the humid tropics, substituting at least partially for purchased nitrogen fertilizers or providing a source where access to fertilizers is limited.

- Genetic improvement research over the past 15 years in Brazil has resulted in doubling eucalyptus yields from 33 to 70 cubic meters per hectare per year (Aracruz Florestal).

- Research has contributed in a major way to the fivefold increase in rubber yields achieved in Malaysia since 1920. The estimated rate of return on investment in rubber tree research in Malaysia is 22 percent (Pee 1977).

- FRIN has had major achievements in the area of vegetative reproduction of *Triplochiton scleroxylon*, an indigenous species threatened with overexploitation almost to the point of extinction. Due to difficult phenology (it fruits every five years), the only reliable means of mass regeneration in plantation is by vegetation propagation, a system now perfected for the species and being extended to equally valuable but silviculturally difficult indigenous species, particularly the West African mahoganies. The project is the nucleus of the proposed network of West African Hardwood Improvement Project being considered for sponsorship by the EEC (personal communication P. Kio).

- Large-scale trials of mechanized afforestation in the semi-arid zone of Nigeria has been attracting tremendous interest inside and outside the country. As a strategy to save the remaining moist forest stands of the south, emphasis for large-scale plantations has shifted to the Savanna belt of Nigeria which makes up over 75% of the country's land area. The project is sponsored by the Japanese International Cooperation Agency

(JICA) and plans to set up 690 ha of plantation of pines *(Pinus caribaea, P. oocarpa)*, eucalypts *(E. citriodora, E. cloesiana, E. camaldulensis,* and *E. saligna)* and some indigenous savanna species *(Prosopis africana, Parkia biglobosa, Acacia* spp., and *Khaya senegalensis).* The project is in its third year of operation and has executed several espacement and land preparation experiments, some of which are already showing astonishing results in terms of highly improved growth rates (personal communication, P. Kio).

- A program of eucalyptus selection and breeding initiated in the early 1950s by CTFT in the Congo has led to improved commercial plantations that are planned to produce several million cubic meters of wood per year, mainly for pulp and paper. Mean annual growth per hectare is in the 25 to 40 cubic meter range (L. Huguet, personal communication).

- In the Tree Seed Centre programme for developing countries of Australia's CSIRO, estimates were made of the value of timber and areas likely to be planted with improved seed in nine developing countries. Financial internal rates of return on incremental investment in the most productive seeds were calculated (Development Digest 1988). They ranged from 22 percent in Lesotho to over 80 percent at Dongmen, China. In addition to financial benefits from timber, other benefits included improved tree form, earlier harvest possibilities, reduced maintenance, and improvements in agroforestry and soil conservation results.

- OFI has promoted worldwide distribution and use of Central American tropical pines through its research network. Through the network, OFI has helped collect, distribute, test, and evaluate various genetic stocks of these pines. By exchanging seed, standardizing experimental design, and developing information systems, the network has enabled countries to match the genetic material to a site, thereby increasing plantation yields.

### Contributions of Utilization Research

Examples of useful research include the following:

- Economics research by Reiche and Campos (1986) shows that drying coffee in Costa Rica with electricity is about six times—and using diesel fuel is three to four times—more expensive than using wood. This type of research has significant direct implications for fuelwood and other energy markets and indirect implications for policies on forest protection and energy in Costa Rica.

- Research has permitted Malaysia to increase the number of species it uses commercially from 100 to more than 654 in 100 timber groups (Salleh Mohd. Nor, personal communication). Similar progress in species utilization has been made in Costa Rica and other countries. Research in the Philippines, Colombia, and several developed countries has vastly increased the range of species from the natural tropical forest which can be utilized in paper production, thus opening up opportunities for productive, sustainable use of previously unused resources.

- Ten years ago, rubberwood was unknown as a commercial species in Malaysia. Research on species properties, processing, protection, and utilization led the way to markets for

rubberwood. As a result Malaysia exported over 258,000 cubic meters of rubberwood in 1987 with a value over M$37 million (Salleh Mohd. Nor, personal communication).

- As one of the oldest research institutes in West Africa, FRIN has taken the lead in popularizing the use of lesser known species (LKS), having expanded the resource base of the timber industry twofold by conducting research into the LKS properties (strength, seasoning characteristics, and durability) at first in collaboration with Princes Risborough Laboratory in Britain and, from the 1970's, in its own laboratory at Ibadan.

- Research in six countries reported by Fisseha (1983) indicates that the contribution of forest-based small-scale enterprises (SSEs) to total SSE employment varies between 13 and 34 percent. Their contribution to total value added varies between 16 and 47 percent, and to total value of production from 14 to 49 percent. In all cases forest-based SSEs were one of the more important sectors.

Some of the developed country technologies which are being considered or applied because of potential rapid payoffs in tropical countries through adaptive research include:

- power backup rolls for veneer production, which permit higher veneer recovery and peeling of difficult species;

- press drying in paper making, which uses short fiber hardwoods and consumes less energy;

- wood preservation to overcome decay and termite problems;

- improved wood engineering for cost savings and other benefits in housing production;

-developing uses for lesser-known species;

- waferboard and other reconstituted wood products technologies permit use of many different species and treatment for fire, decay, and insect resistance; and

- improved harvesting and transport technologies which can lower costs and reduce environmental damage from logging.

- Bengston (1984, 1985) found average economic rates of return (ERR) of 19 to 22 percent for structural particle board research and 34 to 40 percent for lumber and wood products research in the United States. Haygreen et al. (1986) calculated that public investment in all timber utilization research in the United States had economic rates of return between 14 and 36 percent, depending on assumptions used concerning costs to be included. (In the lowest rate, 14 percent, all costs of research on timber management, forest products utilization, and forest products marketing were included.)

## Contributions of Policy and Socioeconomic Research

Examples of useful research include the following:

- Kumar and Hotchkiss (1988) show how the progressive encroachment of cultivation into forested areas forces women and other members of farm families to walk increasing distances to gather fuelwood and fodder from trees. This reduces the time that they can work on their farms and reduces farm productivity. As a result, families are forced into a

further extension of area under crops to produce enough food, perpetuating a downward spiral of decreasing output from both arable and forest areas.

- Arnold (1987) reviewed selected research on agroforestry from an economic point of view. He considered the influence of relative scarcity of factors of production on farmers' decisions and found that they often maximize returns to labor input rather than capital. Often this is because the opportunity cost of labor is high, and tree growing takes less labor and involves more flexible timing.

- Dewees (World Bank 1986b) researched how farmers in parts of Kenya are conditioned by availability of capital and labor. In areas where labor is scarce, tree growing may take place where the returns per hectare are lower than from other crops, but the returns to labor are some 50 percent greater than from maize production. Reduced risk also entered the picture.

- Research at CATIE shows that returns to farmers can be more than twice as high when pure pasture management using post fences is changed to pasture management using living fences with clumps of trees scattered throughout the pasture (personal communication from R. de Camino).

- Anderson (1987) carried out detailed research on the economics of multipurpose tree species in Nigeria. The results indicate that rates of return can increase from 7.4 to 16.9 percent when soil conservation benefits are included in addition to wood and fruit benefits in agroforestry components, and from 4.7 to 21.8 percent when shelterbelt soil conservation benefits are added to wood benefits (poles and fuelwood) alone.

- An ILO study in 1987 showed that subsidy policies to encourage substitution of kerosene for wood-based fuels were very effective in Addis Ababa, Ethiopia; some 60 percent of the population shifted to kerosene within four years. On the other hand, a World Bank household energy study in 1974 showed that in Senegal it was the more affluent urban households who benefitted from the campaign initiated in 1974 to encourage substitution of butane for wood-based charcoal. At the national level, introduction of liquid propane gas led to savings of only about 16-17,000 tons of charcoal annually, after 13 years of promotion and subsidization. The impact on forest conservation has been minimal.

- A recent study by the WRI (Repetto 1988) reveals that, in Indonesia, Sabah/Malaysia, Ghana, and the Philippines, government policies on forest revenue systems and wood-processing industries provided strong economic incentives, which led to accelerated rates of forest depletion and substantial losses of government revenue, due to lack of adequate rent capture from concessionaires. The economic losses due to these policies, in addition to other social and environmental impacts, are enormous.

- Research by Hecht and Schwartzman (1988) indicate that the costs of recuperation of three million hectares of degraded forest land in Acre, Brazil, would be some US$781 million in direct recuperation costs and some US$150 million in extractive benefits foregone.

- Santa Cruz (1988) researched the Chilean forestry incentives program (Law 701) and concluded that the financial rates of return on *Pinus radiata* growing are, on average, high enough without incentives to attract investment. However when Law 701 was passed, there were high risks and uncertainties surrounding investment in pine growing,

further extension of area under crops to produce enough food, perpetuating a downward spiral of decreasing output from both arable and forest areas.

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and particularly a lack of secure markets and liquidity of such investment over the first years. The development of the major Chilean pine export business would likely have been delayed a number of years without the incentives to ease the burden of risk and uncertainty.

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## READINGS FOR MODULE 2

*The following readings have been selected to provide you with additional information related to the material covered in module 2. We hope you will find them of interest.*

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# Strategic Planning in Public
# Forestry Research Organizations[1]

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## Introduction

### What Is Strategic Research Planning?

Strategic research planning is concerned with shaping the nature and direction of a research organization (What is our mission? Where are we going?) and developing broad strategies for accomplishing the mission (How do we get there?). Successful strategic planning involves confronting difficult choices, setting broad priorities, envisioning the organization's future, and developing procedures to achieve that future (Pfeiffer et al. 1989). The time frame is long-term, 10 years or longer in some cases. Strategic planning is the responsibility of senior research management.

A distinction should be made between strategic planning and traditional long-range planning. Strategic planning:

- focuses on identifying, managing, and resolving issues;
- emphasizes assessment of the environment outside and inside the organization; and
- is concerned with the "vision of success" of a research organization and how to achieve it.

Long-range planning:

- focuses on achieving specified objectives of the organization;
- emphasizes management of the internal environment — the human, financial, and physical resources expected to be available to the organization; and
- tends to be based on historical projections and does not work well under changing external conditions.

Long-range planning has the flaw of focusing managers' attention on predicting rather than creating the future (Hanna 1985).

### Why Is Strategic Planning Needed?

Uncertainty, complexity, and change characterize the external environment in which research organizations operate. Research managers need to respond quickly and effectively to changing circumstances. Strategic planning helps to define an overall sense of direction and purpose for a research organization, and thereby helps managers respond to change. Vihavainen (1987) notes

that the dynamic and uncertain environment of research suggests that dynamic management systems — including strategic planning — are well suited for the management of research.

Several potential contributions of strategic planning may be identified, including:

Short-term benefits:

- raising awareness about the external environment
- improving the dialogue among managers on strategy
- improving the dialogue between managers and professional staff
- improving the dialogue between the research organization and its stakeholders
- building teamwork and planning expertise

Longer term benefits:

- providing direction, coherence, and unity to organizational efforts
- improving organizational performance
- stimulating forward thinking in the organization, especially among top managers

The last point is perhaps the most important contribution. Strategic planning is not an end in itself, but should help research managers *think* and *act* strategically. Successful research organizations have always been guided by strategic thought and action, and a strategic planning process can aid in developing this perspective.

# A Strategic Planning Process

The approach used for strategic planning should be adapted to suit the nature and circumstances of the particular organization (Milne 1989). Strategic planning in a large corporation will differ in certain ways from strategic planning in a small, public research organization, e.g., in the size of the planning team, resources devoted to the planning effort, the amount of involvement from outside the organization. But the essence of strategic planning is a process of thinking that is largely independent of scale and is useful in all types of organizations (Goldsworthy 1987). As Espy (1986) notes, if an organization is large enough to work, it is large enough to plan.

This section provides a systematic approach to strategic research planning that can be adapted to the needs of a particular research organization, and implemented by existing personnel at reasonable cost and in a timely fashion. The following strategic planning process is adapted from Bryson (1988), Pfeiffer et al. (1989), and Barry (1986), and is depicted in Figure 1. It is similar to the process used in recent nationwide and regional strategic planning efforts of USDA Forest Service research (Sesco and Bey 1989, Alig 1989).[2] The planning process involves eight major steps:

1. Initiating and agreeing on a strategic planning process
2. Identifying and clarifying organizational mandates
3. Conducting a stakeholder analysis
4. Developing a mission statement

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2. See Goldsworthy (1987), Rocheteau (1987), Milne (1989) and Collion (1989) for other descriptions of strategic planning processes for public research organizations and research systems.
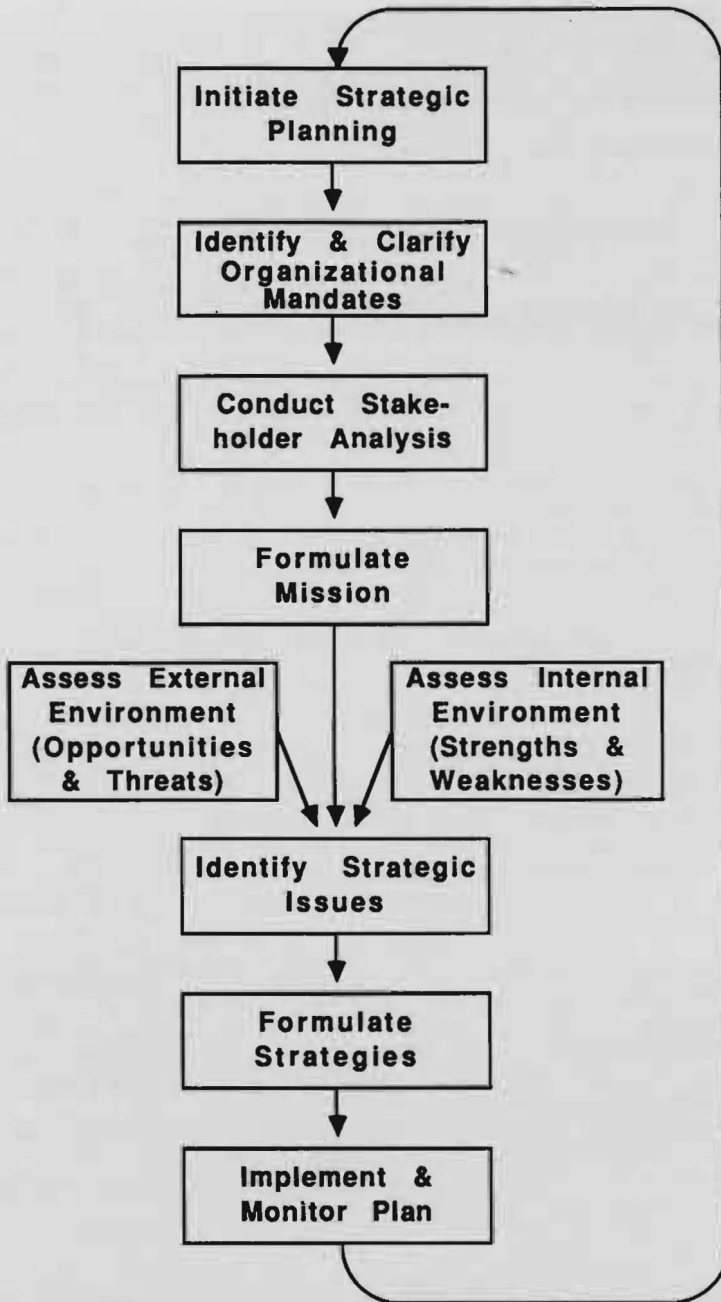
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5. Assessing the external and internal environments
6. Identifying strategic issues
7. Formulating strategies to manage strategic issues
8. Implementing and monitoring the strategic plan

The following sections describe these steps.

## 1. Initiating and Agreeing on a Strategic Planning Process

The first step in strategic planning is to reach initial agreement about the nature, purpose, and process of strategic planning. A strategic planning team should be formed to address the following important preliminary questions: Who should be involved in the effort (individuals and organizations)? Who will be on the strategic planning team? Who will oversee the effort? What are the potential benefits to the organization of strategic planning? What resources are needed to proceed with the effort? What are the desired outcomes? What specific steps should be followed? What should be the form and timing of reports?

Key research decision makers should be included on the planning team, and perhaps some representatives of important external "stakeholder" groups (e.g., representatives from forest-based industries, conservation groups, government agencies that use research results). On the other hand, research managers may decide not to involve external stakeholders initially — outside involvement will complicate the process. Representative team leaders and scientists should also be involved from the begining. The planning team should include one or more highly intuitive individuals, who tend to be the most innovative and insightful in strategic thinking and decision making (Agor 1989).

The appropriate number of people directly involved in strategic planning will depend on the size of the research organization. In small research organizations, the planning team may be very small, consisting of a few key individuals. In medium-size organizations, two groups may be required to help ensure an effective planning effort: a relatively large group to provide broad representation and legitimization of the planning process, and a smaller executive committee that does most of the actual work and makes recommendations to the larger group. Large organizations may want to structure the planning process by establishing several specialized committees. Alig (1989) describes four planning teams set up at the USDA Forest Service, Southeastern Forest Experiment Station:

- Policy team. Consisting of the Station Director and other research managers, the policy team makes decisions and provides input to the planning process.
- Core team. Representatives from management, scientists, information services, and the National Forest System (a major user of research results) make up the core planning team. Their task is to facilitate the planning process by gathering information and making recommendations to the policy team.
- Expert teams. Several teams of senior scientists provide technical expertise, e.g., to ensure that that research goals are in fact attainable.
- Review team. Draft planning documents are reviewed by a team of stakeholders from inside and outside of the Forest Service.

## 2. Identifying and Clarifying Organizational Mandates

What is the research organization required to do and not do? Consideration should be given to formal mandates such as legal requirements and government policy and appropriations, as well

as to informal mandates such as interest group reports, agreements and understandings with other organizations, and social norms, that are no less binding. The purpose of this step is to identify externally imposed mandates and clarify how they affect the research organization. By clarifying what is not ruled out by the mandates, the rough boundaries in which the organization may operate become clearer.

The process for identifying organizational mandates is straightforward. The strategic planning team (or several individual members) compiles a list of formal and informal mandates affecting the organization. This list is reviewed and modified by the entire planning team to clarify what the various mandates imply for the organization, i.e., What is required? What is allowed? Organizational mandates are one of the important inputs used in developing a mission statement in step 4 below.

3. Conducting a Stakeholder Analysis

Stakeholders are defined as people, groups, or organizations that have a claim on the research organization's attention, resources, or output, or are affected by that output. Examples of stakeholders for a research organization include public officials, governing bodies, a wide variety of interest groups (such as industry groups, conservation groups), extension agents and organizations, future generations, farmers, taxpayers, other public and private research organizations within the country, research organizations in other countries, educational institutions, international donor and technical assistance agencies, and employees. Important employee groups should be explicitly identified as stakeholders. Scientists are perhaps the most important employee group because their own satisfaction is important to the success of a research organization. Moreover, scientists tend to judge organizational performance based on standards of scientific research, and they hold the organization more to exacting scientific and professional standards than other stakeholder groups do.

A key to the success of a research organization and its ability to generate financial and political support is the satisfaction of key stakeholders. An organization that does not have a clear idea of who its stakeholders are, what they want from the organization, and how they judge the organization will have little chance of satisfying them. The stakeholder analysis can be structured around the following questions:

- Who are the organization's stakeholders?
- What do they want from the research organization?
- What criteria do the stakeholders use to evaluate the research organization?
- How is the organization performing against those criteria?

The first question can likely be answered through a brainstorming session of the strategic planning team. The second and third questions can be approached in two ways. One is for the planning team to make informed judgments about the wants and evaluation criteria of stakeholders. The second approach is to ask the stakeholders, through interviews or surveys, what their wants and criteria are. The first approach is obviously much faster and avoids any problems with stakeholders not being completely honest. For example, an elected official may be concerned primarily with whether the performance of the research organization enhances his or her prospects for reelection, but would be unlikely to publicly state this criterion.

The fourth question to be answered in the stakeholder analysis concerns how well the organization performs against the stakeholders' criteria. To prompt useful discussion on this question, it may be sufficient to indicate whether the organization's performance is poor, sufficient, or excellent relative to the various criteria. Once the stakeholder analysis has been

completed, it should serve as a basis for discussion of exactly how the various stakeholders influence the organization and which are the most important stakeholders. It may be useful to rank the stakeholders according to their importance to the organization.

## 4. Developing a Mission Statement

A well-conceived mission statement can be a valuable managment tool, providing future direction and a basis for decision making. A mission statement should ideally serve as a guide to what management wants the organization to be (Pfeiffer et al. 1989). It should remind and motivate researchers and other employees to identify with the goals and philosophy of the organization, and orient employees toward the national needs that the organization exists to fill. Mission statements should also fulfill an important public relations role by concisely communicating to stakeholders what an organization is all about. Unfortunately, many forestry research organizations do not have mission statements — they are noticeably absent from annual reports and other key documents.

The stakeholder analysis provides information that is useful in developing a mission statement, but much more is needed. The mission statement should grow out of responses to the following questions:

- Who are we as an organization?
- What social needs do we exist to fill?
- What should our organization do to recognize or anticipate and respond to these needs?
- How should we respond to our key stakeholders?
- What is our philosophy and what are our core values?
- What makes our organization distinctive or unique?

Thoughtfully addressing these questions and developing a mission statement is a demanding process. Each member of the strategic planning team should answer the questions individually first, and then come together as a group for discussion. After the group discussion, the task of developing a draft mission statement for further discussion should be assigned to an individual. The draft mission statement should be discussed and modified as needed throughout the remainder of the strategic planning process. Figure 2 is an example of a forestry research mission statement for the Newfoundland Forestry Centre of Forestry Canada. It concisely describes what this organization does, who its stakeholders or clients are, and the desired impact of its program.

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The Newfoundland Forestry Centre of Forestry Canada is the lead federal agency in Newfoundland and Labrador responsible for:
- conducting forestry research to produce scientific and technical knowledge,
- managing forestry development agreements and related programs,
- disseminating scientific and technical information, and
- providing forest policy advisory services,

to enhance the economic, environmental and social benefits from the forest resources in the region. The principal clients are the provincial, federal, and private forestry related agencies, the scientific community, educational institutions, and the general public. The programs of the NeFC are designed to have a significant impact on the forest sector, primarily in the region, and contribute to national and international knowledge in forestry.

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Figure 2. Mission statement for the Newfoundland Forestry Centre, Forestry Canada. Source: Milne (1989).

## 5.  Assessing the External and Internal Environments

A major purpose of strategic planning is to identify external threats and opportunities that may demand a response in the foreseeable future.  The idea is to prepare an organization to respond effectively before a crisis develops or an opportunity is lost.  Assessing trends in the external environment for research is therefore an important part of strategic research planning.  What are the recent issues and emerging trends affecting the research organization?  These could include political, economic, social, technological, and environmental trends and issues that may be local, national, or worldwide in scope.

Some large public organizations use formal, institutionalized "external scanning" procedures (Pflaum and Delmont 1987).  But elaborate and demanding procedures are generally less desirable than simple and practical approaches.  Most research organizations rely on the knowledge of members of the strategic planning team and use group discussions to identify external threats and opportunities and assess their significance to the organization.  Other approaches include organizing workshops involving stakeholder representatives to identify major issues, or using various survey techniques (e.g., Milne 1988, Gregersen et al. 1989, Jakes et al. 1990).

The internal environment should also be assessed to identify strengths and weaknesses that help or hinder the organization in carrying out its mission.  Broad categories of internal strengths and weaknesses include:

- resources available to the organization (such as scientific and technical personnel, support personnel, scientific equipment, facilities, supplies, library and information resources, computer resources, and funding);
- organizational structure (the institutional forms and mechanisms that govern a research organization and by which research priorities are set and resources are mobilized for the implementation of the research program); and
- organizational performance (outputs and the impacts of outputs on clients).

Using these categories, the planning team should develop a list of the major internal strengths and weaknesses of the organization.  This list, along with the list of external opportunities and threats, should then be discussed and analyzed.  Pfeiffer et al. (1989) note that scanning and assessing the external and internal environments should be a continual activity in an organization so that relevant information is always available to key decision makers.


## 6.  Identifying Strategic Issues

The preceding steps of the strategic planning process lead to the identification of strategic issues.  Bryson (1988) defines a strategic issue as a fundamental policy choice facing an organization.  For research organizations, strategic issues affect or call for a reexamination of the organization's mandates, missions and values, and the kinds, level, and mix of research services provided.  Strategic issues usually arise when:

- external events beyond the control of the organization make or will make it difficult to accomplish objectives given the resources available;
- choices for achieving organizational objectives change, or are expected to change (e.g., changes in technology, financing, staffing, managment); or
- new opportunities arise (Bryson et al. 1985).

In identifying strategic issues, particular attention is given to potential discontinuities that

might have a major impact on the organization (Hanna 1985). Examples of strategic issues that a research organization might face include an increasing rate of deforestation, increasing conflicts among groups that utilize forests (Jakes et al. 1990), long-term decline in real research budgets or civil service salaries (Bengston 1989), increasing demand for non-timber forest outputs in the future (Sesco and Bey 1989), a high proportion of scientists approaching retirement age (Sesco and Bey 1989), and privatization of research or other significant organizational changes (Theron 1989). Note that some of these strategic issues relate to changing research needs and priorities, and others relate to research policy, organization, and management.

The process of identifying strategic issues involves first reviewing the mandates, mission, external threats and opportunities, and internal strengths and weaknesses. Each member of the planning team is then asked to individually identify strategic issues by answering three questions for each issue:

- What is the issue? The issue should be described succinctly in a single paragraph and should be framed as a question that the organization can address.
- What factors make the issue a fundamental policy question? How does the issue affect mandates, mission, internal strengths and weaknesses, etc.?
- What are the consequences of not addressing the issue? If there are no consequences, it is not a strategic issue; if the organization will be significantly affected by failure to address an issue or will miss an important opportunity, the issue is highly strategic and should receive high priority.

Planning team members will need time to reflect on these questions, and at least a week should be devoted to individual identification of strategic issues. The entire planning team then convenes and tentatively agrees on what the issues are. Each issue should be summarized on a single page, addressing each of the three questions posed above. Strategic issues are then prioritized to aid in developing strategies to deal with the issues.

## 7. Formulating Strategies to Manage Strategic Issues

Bryson (1988) recommends a five-part process for developing strategies to manage strategic issues. For each issue that has been identified, the following questions should be addressed:

- What are the practical alternatives the organization might pursue to address a particular strategic issue?
- What are the barriers to realization of these alternatives?
- What major proposals might be pursued to achieve the alternatives directly or to overcome the barriers?
- What actions must be taken within the next year to implement the proposals?
- What specific steps must be taken within the next six months to implement the major proposals, and who is responsible?

The purpose of these questions is to clarify what has to be done and who has to do what to deal with each strategic issue. For example, suppose a strategic issue facing a research organization (posed as a question that the organization can address) is: *How can we best recruit and retain a highly talented and qualified research staff?* Practical alternatives to address this particular issue might include:

- Better anticipate shortages of trained research personnel.
- Simplify hiring practices.
- Develop and maintain close ties with universities to identify potential researchers for

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recruitment.
- Improve the system of rewards and incentives for researchers to increase retainment.

Using the last alternative as an example, potential barriers to realizing this alternative might include:

- Lack of funding to increase researcher salaries.
- Rigidity of the mandated civil service system limiting possibilities for career advancement in research.
- Lack of funding to establish a program of financial awards for outstanding researchers.

Proposals to achieve the alternative directly (improve the system of rewards and incentives for researchers) or to overcome the barriers might include:

- Establish a program of nonfinancial awards and recognition to reward outstanding research productivity and quality, contributions to technology transfer, etc.
- Provide opportunities for international travel (to attend scientific conferences or training courses) as a reward for productive researchers.
- Provide other nonsalary benefits to productive researchers.

The last two questions of the five-part process involve identifying the specific actions that need to be undertaken and assigning responsibility for carrying out the strategy to an individual or ad hoc committee. Alternatively, the planning team may address only the first question — identifying practical alternatives to deal with a strategic issue — and a key staff member would then be assigned to follow up on one or more of the alternatives as part of the implementation of the strategic plan.

## 8. Implementing and Monitoring the Strategic Plan

The true test for any strategic planning process is the extent to which it affects the activities of the organization and the behavior of employees. The purpose of strategic planning is to develop a better road map to guide the organization. Unless this road map actually guides decisions and actions, the planning process is nothing more than an academic exercise (Pfeiffer et al. 1989). But implementation of the strategies developed does not follow automatically. Change will be threatening to some and almost inevitably faces resistance. Resistance to the implementation of strategies may take the form of procrastination, "paralysis by analysis," lack of implementation followup, or even outright opposition.

The role of the director of the research organization in implementing the strategic plan cannot be overemphasized. The director should be closely involved in the process from the outset and must be totally committed to the strategic plan and lead the support. All managers need to be committed to the plan and use it to guide decision making, particularly in developing annual objectives and budgets. Management must communicate the plan and its rationale to all employees, especially those that may be affected by it.

Periodic review and updating of the strategic plan and monitoring of its implementation are vital. Every six months the specific steps to implement the plan should be reviewed. Every year or two the strategies to deal with strategic issues should be reviewed and progress evaluated. And every three to five years the entire strategic plan should be reviewed by the strategic planning team and modified as needed. Barry (1986) notes that many organizations review and update their strategic plans yearly, before planning and budgeting for the coming year.

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# STRATEGIC PLANNING FOR
# NATIONAL AGRICULTURAL RESEARCH SYSTEMS:
# AN OVERVIEW

Marie-Hélène COLLION

October 1989

*isnar*

**International Service for National Agricultural Research**

# GLOSSARY

Critical Mass: The critical mass is the level of resources needed either per research activity or per research station in order to achieve the desired objectives. The critical mass required for a particular research activity will be influenced by the type of other research activities in the system, if "economies of scope" are possible. The level of resources is determined first by the human resources required, which then fixes the other resources needed to match them.

Goal and objectives: The goal is the end towards which actions are directed. It is the state to be brought about through a course of actions. A goal is general and fairly broad. It must be specified by objectives. The objectives are specific intermediate ends to be achieved, in the process of striving for the overall goal.

National Agricultural Research System (NARS): Many organizations may be involved in agricultural research: departments of various ministries, parastatal organizations, departments of the universities, private institutions. Whether an organization is included or not in the NARS depends on whether it has developed well-structured and specified linkages with other research institutions in the system.

Organization: A coalition of interest groups sharing a common resource base and depending on a larger context for its legitimacy and development. It has an internal structure, is goal directed, and exchanges resources with its external environment.

Organizational structure or organization structure: It describes an organization's framework: it is the way work is divided into different tasks, and is then coordinated to achieve stable patterns of behavior and output. The organizational structure regulates the flow and exchange of various kinds of resources; i.e., products, services, information, power. Another way to look at organizational structure is the formal division of responsibilities.

Policy: A set of decisions and measures necessary to carry out a chosen course of action to meet specific goals and objectives.

Program: A program is a coherent set of projects and activities (such as training, special studies, etc.) in one specific area of research. The program is defined by a goal, a set of objectives, a research strategy and resources to achieve these objectives. Program scope, size and complexity may vary considerably according to the level of disaggregation and specificity of objectives. Complex programs can group several sub-programs in different regions or involving interlinked projects. They can also cut across institutions.

Programming or program formulation: Programming is the actual design of a program and its components. It implies the definition of a coherent set of projects with their research activities, studies, and experiments.

**Project**: A project is a coherent set of activities with a rationale, a goal, specified by a set of objectives, a plan of action to achieve these objectives, specific outputs and beneficiaries, a limited time frame for execution, and a budget defining resources needed.

**Research Stakeholders**: The groups whose activities are likely to affect the research system, or conversely, the activities of which will be affected by the output of the research system. They are not the direct users of research. They are: 1) the financers of research (government and donors); 2) the groups that make up the environment of agricultural research, such as, for example, the rural banks (their credit scheme will influence the adoption of a technology); the agriculture-based industries and import-export firms (their absorptive capacity of agricultural output will also be a determining factor); and all agriculture-related services; 3) the consumers.

**Scenario**: A scenario is a description of a vision of the future state of a system. It is based on an assessment of its environment, of the forces for change at work and the likely interactions between system variables in the progression from current conditions to a future state.

**Scope of a System**: The scope of a system is an operative combination of the readily available resources into a set of research activities in order to achieve the objectives set for the system. The research activities are defined by their content, the type of research (applied, adaptive and testing, maintenance) and the critical mass of resources (qualitative and quantitative).
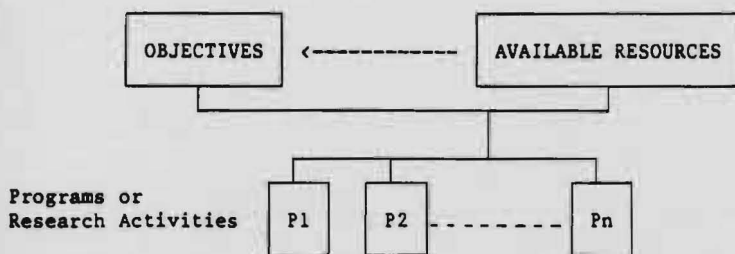


**Strategy**: A course of action, selected among alternatives in the light of a given set of conditions to meet specific goals and objectives; it includes the internally consistent way in which resources will be mobilized to carry out the course of action and give it the maximum support.

**Structure**: The elements or components of an entity and the position of such elements or components in relation to each other. The way in which the elements are put together or organized.

**Sustainable Research System**: A sustainable agricultural research system is one in which the contribution from external sources does not bring the overall funding level above the one a country would be prepared to reach progressively within a definite schedule.

# ACKNOWLEDGEMENTS

# 1.  INTRODUCTION

## 1.1  Purpose

The purpose of this paper is to contribute to improving the
effectiveness of policy elaboration and planning by laying out a
systematic and normative process using a long-term strategic
approach.  Presented is a model, that is, an abstraction from
reality, a reflection of it.  A model can neither reflect reality
perfectly nor completely:  particular country circumstances have to
be left out in its elaboration.  As such, it cannot be applied in
any given situation without first being adapted to the specific
situation.

## 1.2  Structure and Content

Chapter 2 presents a definition and rationale for planning.  What
can be achieved through planning?  What are the inefficiencies it
addresses?  The paper adopts a specific approach to planning termed
strategic, defined in chapter 3.  The advantages of drawing from the
principles of strategic planning over the classical,
projection-based method are discussed.  Though developed for the
private sector in the West, the principles and process of strategic
planning can be quite relevant for agricultural research in
developing countries.  The specificity of such an approach is
highlighted.

One of the particularities of agricultural research planning is that
it takes place within a "system" encompassing various organizational
entities, with or without a centralized structure for
decision-making and/or coordination at the top, generally referred
to as the "apex".  The planning mechanisms will differ according to
the type of structure and organization within which it is carried
out.  However, whatever the structure, two levels of planning are
present: a national or system level, discussed in chapter 4, and an
institute one, in chapter 5.  At each of these levels, the object of
planning is obviously different:  respectively the whole system and
only the institute.  However, the planning process goes through the
same steps.

The output of planning at the system level is a national
agricultural research policy for the long term which serves as an
input for the planning process at the institute level.[1]  The output
at the institute level is an institute strategic plan for the same
long term, including a description of the institute policies, its
programs' objectives and strategy, and the long-term plan for the

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1) Long term should be lengthy enough for the agricultural research system to achieve
   control over the future.  The actual number of years will vary according to several
   factors, mainly the scope of the ambitions for the system.

development of the resources in support of its programs. The
institute long-term strategic plan is translated into a plan of
action for implementation. The time span corresponds to the period
for which resources are known and environment changes are
predictable (generally not more than three to seven years).

Chapter 6 introduces the issue of the organizational devices and
planning mechanisms necessary to perform the planning functions. An
example is given, based on the strategic planning principles: at the
same time bottom/up and top/down, emphasizing participation of all
concerned (i.e., planning should not be left to so-called planners
alone). However, the description remains fairly general, as the
mechanisms and organizational devices that are required for the
purpose of planning vary greatly according to the type of
organizational structure and the socio-political environment of each
NARS.

## 1.3  Necessary Further Work

It is hoped that the framework will be of use to NARS leaders.  In
order to facilitate the adaptation of the model to the particular
circumstances of each NARS, it would be useful to illustrate it
through case studies of the planning process; that is, what type of
planning approach, and in particular, what planning mechanisms and
organizational devices have been taken in different contexts,
characterized by the type of organizational structure of the NARS,
the socio-political and cultural environment, and the level of
institutional development.

The paper emphasizes the approach (i.e., strategic rather than
projection-based planning) and the process of strategic planning
when applied to NARS. It also addresses the issues at each step of
the process but does not go into the information to be gathered and
analyzed. Both the illustration through case studies and the
information to be gathered would be useful when implementing the
model. This, however, deserves further work.

## 2. RATIONALE FOR PLANNING

"A successful planning process does not end with a formal document that is then put aside, but rather it taps the lifeblood of the organization in a way that permanently changes the way its members think and act."

Pfeiffer (1987:27)

### 2.1  How Much Should Research be Planned?

A number of people do not feel comfortable with the idea of planning, especially insofar as research is concerned.  The word planning often rings bells of Eastern-block central-planning systems, of bulldozing the researchers' necessary creativity and insight into the straight-jackets of a top/down and rigid blueprint.  In the minds of others it brings out images of "experts", using valuable resources while cranking out numbers and toying with sophisticated models in the secrecy of their planning units; producing plans, which are destined to gather dust on shelves.  These unfortunate views often result from the lack of participation by people concerned in the planning process; lack of understanding of the models and confidence in their outputs, as they are often perceived as non-adaptable to real situations; and using data of dubious quality.

Agricultural research planning need not be stultifying.  On the contrary, planning can increase the effectiveness of individuals and organizations by sharpening the focus of research activities on the most relevant areas for agricultural development, through developing a sense of mission and commitment, and improving the flow of information between the various actors concerned with agricultural research.  Nor should the understanding of the planning process be reduced to the use of economic models for allocation of resources. Planning goes beyond the use of models which are only tools that may (or may not) be utilized as part of a larger process.

The answer to the question "How much should research be planned?" depends on whether planning, in the particular circumstances of a country, can fulfil its purpose, which is to improve the productivity (i.e., the effectiveness and efficiency) of agricultural research.  Before embarking on a planning process, what needs to be clarified is whether better planning is the correct and only remedy for the identified problem.  Thus, in order to make the final decision to go ahead with planning, it is necessary to define its objectives, content and scope, and the approach that will be taken (in particular who is going to be involved, what planning mechanisms will be put in place).

## 2.2 Definition of Agricultural Research Planning and Policy-Making

Through agricultural research planning and policy-making, a country translates its development objectives into research objectives, priorities, and strategies with various time horizons. It allocates its resources to major program thrusts reflecting these objectives, priorities and strategies. The planning process considers two sets of issues in parallel:

1) What are the country's social, economic and agricultural development objectives and what can and should be the contribution of research towards the achievement of those objectives? This leads to determining the ideal objectives of agricultural research.

2) What are the capacities and resources that can be applied to this end? A realistic set of research objectives and the expected research output is determined through an iterative matching process between the two.

   A strategy to achieve this end result is then specified in operational terms (activities and timing; human, physical and financial resources to be used; organizational structure required). (See Fig. 1.)

## 2.3 Context of Planning and Policy-Making

Planning is concerned with the national agricultural research system as a whole, and parts within the system. There are many entities that can be engaged in agricultural research in a country. At the core lie public institutes/ministerial departments created for the primary purpose of agricultural research. They may have developed specific links with universities, parastatals, private research foundations or companies, and research-development projects.

Whether the latter are considered as part of the agricultural research system or only constitute part of its environment depends on whether the relations are specified and structured and not merely ad hoc; that is, for an entity to be considered as part of the agricultural research system, it is not sufficient that it conducts research relevant to agricultural development: it should also "behave" as if it is in the system.[2] The linkages are part of the system: 1) between the institutions themselves; 2) with the extension services; 3) with policy-making bodies; 4) with external sources of knowledge.

Among other things, policy-making and planning purports to determine:

1. the size, scope and mission of the research system, the overall level of resource allocation and the criteria for major technological and societal choices;

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2) Dagg and Eyzaguirre (1989:8).

Figure 1: What is Planning?



Ideal Goal/Objectives

Resources

What is desirable?

What is available?

Iterative Process

What is needed?

What is feasible?

Realistic Objectives

Strategy to Achieve Objectives
- Activities
- Timing
- Human Resources
- Physical Resources
- Financial Resources
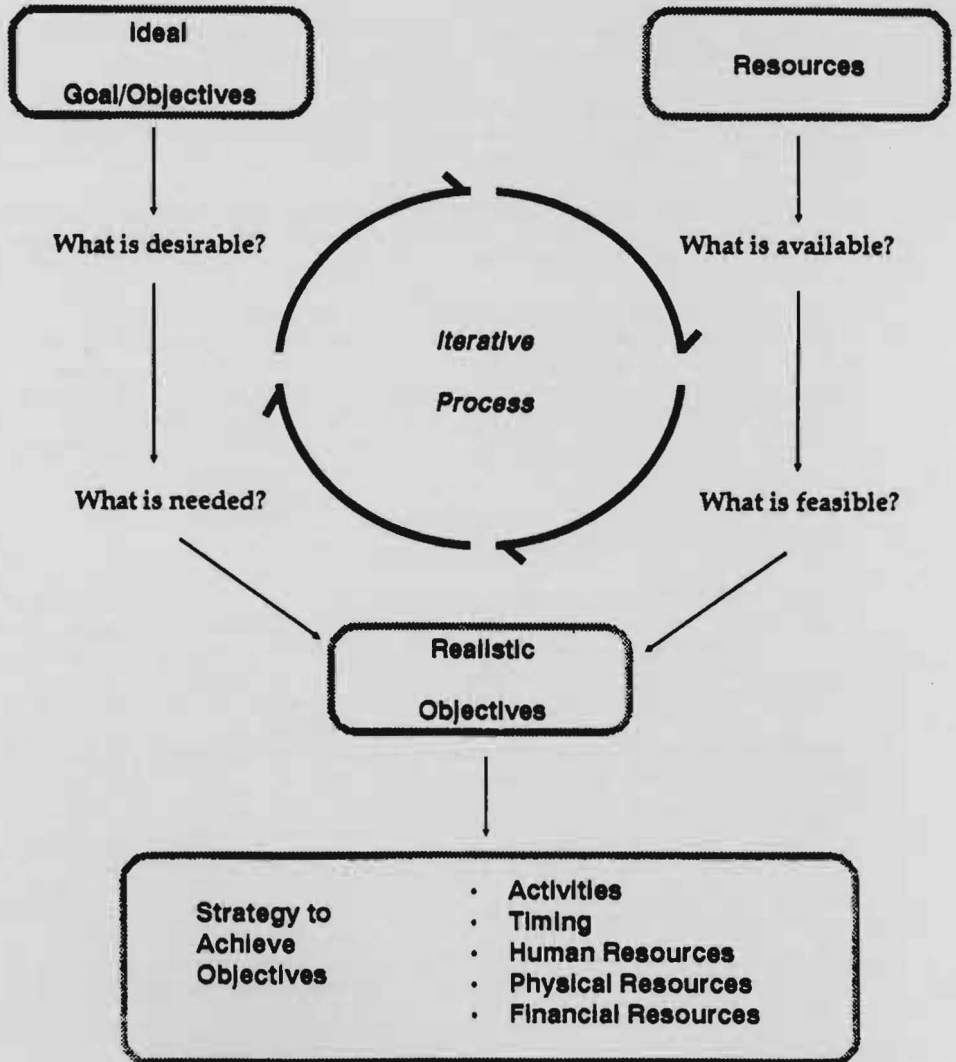
2.   agricultural research objectives in function of 1) the overall
     development objectives; 2) the agricultural Science and
     Technology policy; 3) the available resources;

3.   the research programs and the criteria on which to base
     priorities between them; and for each research program, the
     strategies that appear best suited to achieve the research
     objectives; within each research area, the constraints that
     should be addressed in priority;

4.   the planning methods and tools, to prioritize between research
     areas and to allocate scarce resources accordingly; this will
     serve as the framework for the elaboration of research programs;

5.   the necessary adjustments in the organizational structure of
     the research system in order to ensure adequacy between the
     mandate assigned to research and its structural support system;

6.   the mechanisms and organizational devices for planning,
     communication, and coordination, reporting, monitoring and
     evaluation, such that: a) farmers' needs and constraints be at
     the core of program design; b) feedback linkages between the
     various actors concerned (i.e., policymakers, research leaders
     in various institutions, extension agents, farmers, private
     entrepreneurs, etc.) function efficiently.

## 2.4   Issues to be Addressed through Planning

Since ISNAR started in 1981, it has been involved in 40 reviews of
agricultural research systems. A number of issues were found to be
common to many systems; issues that can be referred to as planning
and policy issues. This does not necessarily mean that better
planning will be sufficient to address these issues successfully:
most of the time, they will require a combination of tools, that is
not only planning tools but also management and organizational
ones. In what follows, a number of these issues which can be
addressed through planning will be discussed.

### Resource allocation issues

Appropriate overall funding. Funding levels are usually measured as
a proportion of the value of the agricultural product (AgGDP).
According to this measure, developing countries spend substantially
less on agricultural research (0.5% and even less of their AgGDP)
than the developed ones (2%).

On the human resources side, the number of scientists per unit of agricultural GDP is three times higher in developed countries than in developing ones.[3] These figures are often quoted to highlight the insufficient funding of agricultural research in developing countries and to argue for investment targets of 2% of AgGDP.[4]

The conceptual basis for such recommendations is far from established. However, it is fair to say that social gains could have been higher had more funds been invested in agricultural research, as demonstrated by ex-post analysis of return on investments.[5]  It has been argued that the insufficient research support partly reflects the lack of political influence of research users in developing countries, in particular farmers.[6]  In addition, many decision makers and development planners are unaware of the potential contribution of effective and efficient research to agricultural development.

To their defense, it is fair to say that in many instances, agricultural research, suffering as it has been from a number of illnessess, has had less impact than could have been expected.  In addition, research output is only a potential for increased production.  There are so many intervening factors before a technology is adopted that its impact on agricultural output is far from being secured.  Therefore, policymakers are often tempted to make alternative investments with a more immediate pay off.

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3)   Using figures from 130 countries, the weighted average of public investment in national agricultural research, including donor funding, was 0.39% of the agricultural GDP during the period 1975-79, and 0.42% during the period 1980-85. Figures from the same period for 22 developed countries show rates of investment of 1.58% and 2.01% respectively. The number of scientists per billion agricultural GDP was 61 in developing countries and 194 in developed countries for the period 1975-79. The figures were 74 and 231 respectively for 1980-85. Expenditures as a percentage of AgGDP have been calculated on the basis of agricultural research expenditures taken from Pardey and Roseboom (forthcoming 1989) and AgGDP data provided by the UN Statistical Office, New York.

4)   World Bank (1981:8).  ISNAR has also been using these figures to argue for higher investments in agricultural research.

5)   For an exhaustive overview of the studies on economic return to research investments, see in particular, Echeverria, Ferreira and Dabezies, (Forthcoming), which updates for Latin America the study done by Ruttan (1987:Chap.6).  Echeverria points out the fact that not all costs were included in the various analyses, thereby biaising the results upwards.  In particular the costs of public extension, additional inputs, private research and extension are commonly left out.  Even taking these costs into account, the figures would remain quite high, as he demonstrates using the case of rice in Uruguay.

6)   This point has been made in particular by Ruttan (1987:180-1).

The low level of support may well lie with the overall limited investments in agriculture, as a result of financial and political constraints.[7] Whatever the cause may be, there is a need to determine the appropriate level of funding for the particular circumstances of a country, taking into account the potential agricultural research contribution as well as the financial capacities of the country.

Imbalance in the funding allocation between research infrastructure, operating funds and human resources. In the last three decades, the number of scientists in developing countries has quadrupled. However, the expenditure per scientist shows a steady decline from a peak in 1970.[8] This decline is threatening both the productivity and the commitment of scientists to conduct research. Donor intervention has also tended to be biased in favor of facility development, but, if parallel investments in human resources and program support are insufficient, it creates a burden on recurrent research costs rather than being a source of productivity.[9]

One of the tasks of planning is to determine the proper funding balance. In India, well-balanced donor assistance to agricultural research played a key role in the development of an effective research system. The emphasis was not so much on large expenditures on "bricks and mortar" but rather on the long-term commitment to human resources development and institution building.[10]

Research critical mass. A recurrent problem to be found in almost all systems is the dispersion and fragmentation of scarce resources (human as well as financial) among all possible researchable areas, and often among too many research stations. Since resources are limited, this dispersion results in a very weak resource-support for each research area; similarly, the number of scientists per research station may not be sufficient to efficiently provide them with the needed logistical support, and for them to form a group large and diversified enough to be intellectually stimulating. When a minimum level of investment is not reached, scientists can hardly be expected to be productive. Thus the notion of critical mass (i.e. the minimum level of resources needed per program or research station) is a very important one. Obviously, it will vary depending on the characteristics of the program and on the type of activities of the research station; planning is expected to provide firm guidance on minimum levels of investment per research area and per program.

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7) Agricultural research expenditures calculated as a share of total public expenditure on agriculture, show levels of funding as equally high in developing countries as in developed ones (Pardey, Kang and Elliott, forthcoming 1989).

8) See Elliott and Roseboom, (1988:18).

9) This point has been particularly argued by Ruttan (1986, 1987:49).

10) Lele, U. and A.A. Goldsmith (1989).

Sustainability. The issue of sustainability is also becoming critical, at least for certain systems in which external funding provides for a large part of operating expenses. A sustainable agricultural system can be defined as one in which the contribution from external sources does not bring the overall funding level above what the country would be prepared to reach progressively within a definite schedule.

Unfortunately, most countries, stranded as they are in the webs of financial difficulties, tend to accept offers of external assistance without much discrimination as long as it is a subsidy. If the assistance is withdrawn, the country has to let programs or facilities wither away, or else chase other donors for continuing support.[11] Planning should help a country define what level of external assistance it should accept, based on the overall level of funding it is prepared to put into its agricultural research.

## Agricultural research policies.

In many cases, decision makers have not been giving much attention to the definition of a national agricultural research policy. As a result, the necessary choices regarding the scope of the research system, its mission, the strategies to fulfil the mission have not been made, and broad guidelines to determine the most appropriate allocation of resources are lacking.

In addition, communication mechanisms between researchers and policymakers are often ineffective or even non-existent, leading to research and development objectives being conceived in isolation. On the one hand, the overall development and agricultural objectives of a country are poorly translated into agricultural research objectives, resulting in research programs being elaborated without the necessary reference to them. On the other hand, decision makers are often unaware that the economic policies to which they contribute may create an unfavorable environment for the adoption of research results.

## Relevance of research programs.

Poor research program design, in terms of their relevance for the needs and adoption capabilities of the research users has been recurrently noted as one of the weaknesses. As a result, technologies with little value to the farmers have been generated, while scarce resources have been expanded for their generation. Here, a number of factors are at play, including the organization of research, often along single

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11) C. Eicher's concern that the huge transfer of funds into African NARS planned for the next five years (approx. US$300 million a year) may overload research systems is well taken. These systems, he argues, are still at an early stage of institutional development and should be developing their own domestic political support (Eicher 1989). Contrary to these massive inflows of funds, it may have been a blessing for the agricultural research system in India that external assistance was parsimonious, allowing it the time to develop institutionally (Lele and Goldsmith 1989).

discipline lines. Such an organization encourages a mono-
disciplinary and technical approach to the multi-faceted problems
confronting the farmers, while a farmer-centered management approach
would be necessary in many cases. Moreover, in the absence of clear
national guidelines, researchers have tended to pursue scientific
objectives for recognition in their discipline, an objective that
has deterred them from being responsive first to the needs of the
farmers.

Part of the problem confronting researchers when designing programs
arises from the fact that in many developing countries, farmers,
especially small farmers, do not have the political power necessary
to influence the design of research programs; nor are they able to
articulate their technology needs, because of institutional and
social barriers. One way of overcoming this problem is through a
systematic process of information gathering on farm-level
circumstances, coupled with on-farm research activities, as a basis
for research program design; or else, to structure programming
mechanisms in such a way as to substitute for direct user
participation in program definition.

Unfortunately, collecting and processing information also
constitutes one of the weak points of the research systems. On-farm
research or farming system research should provide the on-station
researchers with the necessary information to design their research
activities. An analysis of some on-farm research programs shows
that it has been difficult to implement the feedback function.[12]
The existing planning and programming mechanisms are usually not
designed for the purpose of compensating for the communication
problems between researchers and research users.

Coordinating mechanisms.

Research tends to be carried out by different ministeries and
multiple institutions, including universities and the private
sector. While the dispersion of research activity should not be a
problem in itself, ineffective coordination and communication
mechanisms often result in researchable problems left unattended,
the development of parallel research projects on topics of dubious
relevance and, in general, a less than optimum use of the scarce
resources allocated to research.

Public and private research/International, regional and national
research institutions.

There is a natural division of responsibility between private and
public sector and between the national and international research
centers. Many countries fail to recognize and take full advantage
of the complementarity between public- and private-sector research,
and between international research centers and the national ones.

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12) On the role of client-oriented research, more often referred to as farming systems
    research or on-farm research, in fostering farmers' needs for the design of research
    program, see in particular the analysis of nine cases synthesized by Merrill-Sands
    and McAllister (1988).

As a result, public-sector research does what the private sector could be doing, and policies tend to discourage the private sector from entering the research and technology transfer domain. All of this leads to the allocation of the already scarce public resources to programs or areas within programs that should be left to the international centers or the private sector.[13]

### Research infrastructure and orientation.

Some African countries inherited the costly colonial infrastructure as well as the research orientation that had been established to respond to the requirements of the colonial economy. The pre-independence orientations are no longer appropriate for the technology needs of the agricultural sector in today's independent countries. Reorganizations and adjustments have occurred, but often haphazardly, following demands from pressure groups; or inspired by the organization and the research orientations of research systems in developed countries with different needs and resources altogether.

### 2.5 Potential Contribution of Planning

The above issues should be addressed from different angles: planning but also organization and management. Used together these tools can increase the efficiency and effectiveness of agricultural research, and enable it to contribute to its full potential to the development of the agricultural sector. When complemented by organizational and management measures and if followed by implementation, research policy-making and effective mechanisms for planning, programming and resource allocation could go a long way towards improving the productivity of the research systems.

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13) On the role of private sector research, see Ruttan and Pray (1987:4).

## 3.  PLANNING APPROACH

### 3.1  Strategic Rather than Projection-Based Planning

In the previous section, some of the recurrent issues that could be addressed through planning were highlighted. However, planning is certainly no panacea. Indeed, if the idea of planning is so often met with skepticism, it might be for having failed too many times to achieve its purpose. Perhaps one of the reasons for planning's poor performance lies in the approach used and in not fully recognizing that the process of planning can be as important as the output, i.e. the plans. In what follows, an alternative planning approach to the more "traditional" one will be proposed.

In most national agricultural research systems, central planning, at least at the level of the research institutes, has been given an increased importance through the 1960s and 1970s, often in response to pressures from financial and planning bodies. The concern was primarily a budgetary one, an ex ante justification of the use of financial resources. Techniques linking budget to activities, such as Planning, Programming and Budgeting System (PPBS), and zero-based budgeting, were therefore favored.

An exclusive reliance on budget-based resource allocation techniques, though satisfying for the financial institutions, proved to have serious flaws for the development of the research systems: a longer-term horizon for committing resources to research activities was required. In a number of cases, long-range planning, based on a multi-year forecast of resources and on projection of past trends in terms of research activities and allocation of resources was therefore adopted.

But long-range planning, too, has limitations, designed as it has been for a world characterized by stability, continuity and predictable changes. In contrast, today's environment (both in LDCs and worldwide) features high interdependence, uncertainty, rapid technological change leading to substantial and frequent shifts in comparative advantage, and evolving external conditions. Projecting the vision of the past into the future, long-range planning cannot accommodate fundamental environmental changes; it is a static approach to planning; it tends to discourage the generation of creative solutions and to lead to a routine extension of existing activities.

In response to the inadequacy of long-range planning under changing circumstances, the private sector developed a new approach, termed "strategic planning". Strategic planning focuses on an understanding of the environment and of the forces causing changes; it promotes creative thinking for the generation and evaluation of strategic choices leading to the design of alternative scenarios and the identification of a preferred one among them.[14] This is more than attempting to anticipate the future and preparing accordingly. Behind strategic planning is the belief that the future can be influenced by what is done in the present.

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14)  For a discussion on the benefits of strategic planning over more traditional methods, see
       Hanna (1985:8-13).

## 3.2 Definition and Characteristics of Strategic Planning

The issue is the same as with the more traditional planning approaches: matching objectives to available resources and defining ways to achieve the objectives, given the available resources; and this, through an iterative process. Strategic planning enables an organization to do this, through emphasizing the development of the most desirable vision of its future, evolved from a clear identification of its mandate and analysis of its environment, and resting upon an assessment of its internal strengths and weaknesses. Then, the strategy (i.e., the necessary decisions and actions) to achieve this desirable situation is elaborated and converted into an action plan.

The main characteristics of strategic planning are as follows:[15]

(a) The approach helps an organization create its future, not just plan for it. Instead of a mere projection of past trends, it centers upon the design of alternative scenarios for the future state of the research system and the choice of a preferred one. The analysis of the differences between the current and desired situation, called gap analysis, gives a measure of the changes that have to occur.
(b) The environment is a key element. One of the basic principles is to ensure that research is responsive to the needs of its clients, is sensitive to the interests and expectations of major stakeholders and is driven by the characteristics of the environment, in particular the markets.
(c) It emphasizes action. Strategies to achieve goals are clearly specified and converted into an action plan. Why a particular course of action is selected from among many is clearly stated.
(d) The organizational changes or adjustments necessary for the implementation of the plan are examined and specified as part of the planning content.

Most important, perhaps, is to understand the 'philosophy' of strategic planning, because it has important implications for the conditions required for its effectiveness:[16]

(e) The primary benefit of strategic planning may be less the production of a plan than bringing participants to thinking strategically about the future and creating a measure of consensus on future priorities; the emphasis is more on issues, less on data collection.
(f) Strategic planning cannot be the task of planners only. It is a social process of communication, negotiation and learning between planners, decision makers, NARS leaders, senior scientists and stakeholders. The planners' role is to enhance these processes through the preparation of base materials and the gathering and synthesizing of information and ideas for the elaboration of pilot strategies.

15) Pfeiffer (1986) and Hanna (1985, 1987) provide a good analysis of strategic planning. Ozgediz (1988) and Rocheteau (1989) have applied these principles to the specificity of agricultural research for developing countries.

16) Gray (1986), Mintzberg (1987) and Hanna (1985, 1987) analyze the 'philosophy' of strategic planning.

(g) Key actors within the NARS, as well as outside, participate in its preparation in order to enhance the legitimacy of the decisions taken, foster political support and a sense of involvement from all concerned. It is thus a political process that involves the realignment of interest groups into a coalition for strategic change; this, in order to increase the chance of successful implementation of the plan at a later stage.

(h) It is a top/down as well as a bottom/up exercise: top management must lead and be committed to the planning process, clearly communicating and engendering a sense of a direction and a mission to all staff. At the same time, participation from all concerned is emphasized, in order to produce insightful and creative scenarios and fostering commitment to the plan's implementation. Feedback and iterations between top and bottom are built into the process.

(i) Unlike long-range planning, flexibility is built into strategic planning. It is a continuous process. A strategic plan may be revised to take into account changing circumstances.

(j) Strategic planning will lead to recommendations for strategic changes which can be sustained only if they are supported by appropriate changes in organizational structures and reinforcing management processes. Indeed, strategic planning is only one aspect of a more comprehensive approach to running an organization: strategic management.[17]

## 3.3 Relevance of the approach for agricultural research systems

Developed as it was for the needs of the private sector, strategic planning has received only limited attention from the public sector. However, the environments of public and non-profit organizations have also changed drastically in the last decade.[18] Would a strategic approach to planning be relevant, given the specific circumstances of agricultural research in developing countries?

In many developing countries, stagnant or declining per capita agricultural production and natural resources degradation are prevailing features. Agricultural research is being hard pressed to produce results that will likely have an impact in terms of solving the problems at hand.

In addition, such major technological breakthroughs, like biotechnology, are profoundly modifying the decision-making framework. Such situations deserve some innovative thinking for the

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17) For a discussion of strategic planning as part of strategic management, see Hanna (1985) and Gray (1986).

18) The applicability of strategic planning to the public sector has been the subject of a number of recent articles. See Bryson (1987), Bryson and Roering (1986 and 1988), Bryson, Freeman and Roering (1985).

elaboration of research strategies beyond a mere continuation of the
present.  It calls for a critical diagnosis of the present research
objectives and strategies, usually taken for granted in long-range
planning.

As pointed out previously, being responsive to the needs of farmers
is one of the difficulties in program design.  Strategic planning
precisely emphasizes the analysis of the operating conditions and
the needs of the clients and the evolving market opportunities
(domestic and international).

The participative aspect of the approach appears particularly
relevant.  The specificity of agricultural research lies in the
nature of research itself which requires long-term investment of the
scientists in their subject matter, and presupposes independent
thinkers.  Unlike any other business, orders passed from top to
bottom, particularly those dealing with reallocation of scientists'
efforts, are unlikely to be easily implemented without prior
agreement having been reached with those concerned.  Similarly,
plans elaborated without the scientists' involvement run the risk of
being seriously distorted at the implementation stage.  Thus,
promoting the involvement of all concerned with a view to reach a
consensus on main issues, which seems a key requisite for the
success of agricultural research planning in general, is well served
by the strategic planning approach.

## 3.4  A Word of Caution

The above points to the difficulties of implementing a strategic
planning approach.  Since the process is deliberately designed to
respond to the need for change, it may be resisted by various groups
in an organization where interests may be threatened.[19]  Its
implementation requires a combination of centralization/
decentralization and a participatory approach which can be
inherently foreign to the organization's culture.  It calls for
specific leadership skills for top managers in order to master a
finely tuned combination of management practices: top/down and
bottom/up; all of which may be incompatible with a country's social,
political and cultural environment.  Without the above, though,
strategic planning would lose its power as a change agent.

Another main problem is that planning is usually seen as a separate
function from other managerial functions, as an ad hoc activity in
time, and is carried out by specialists.  Hence strategic planning,
when adopted, falls into the same trap.  Quite to the contrary,
strategic planning should be understood as one of the strategic
management functions; strategic thinking becomes a pervasive
approach to running an organization, and strategic planning, one of
the instruments to run the organization, integrated with others:
budgeting, information management, reporting and organizational
behavior.  Short of this, as with other planning approaches,
implementation will again be the stumbling block.

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19) Rocheteau (1989:18), Hanna (1987:32), Gray (1986), and Bryson and Roering (1988),
    have warned about the difficulties of implementing strategic planning and its
    misuses.

Since strategic planning is becoming very popular, there is a tendency that the term gets applied to anything that may vaguely resemble it. When it goes wrong or is ineffective, strategic planning itself may get blamed, rather than considering whether the conditions necessary for its effectiveness were ever present; or whether the approach used was indeed strategic planning. Because of the importance of the preconditions for its success, strategic planning is not relevant for all situations. Some socio-political and cultural environments simply preclude its use.

Paradoxically, strategic planning is probably most needed where it is the least likely to work. It "would appear to work best in units that have effective policy-making boards, strong and supportive process sponsors, superb process champions, good strategic planning teams, enough slack to handle potentially disruptive crises, experience in coping with major disruptions, and a desire to address what is truly important for the organization. Instead most organizations tend to "muddle through" in a disjointedly incremental way from one situation (often a crisis) to the next. The introduction of strategic planning to such organizations may be doomed to failure" (Bryson and Roering 1988:19.)

In such situations, creating the preconditions for effective planning, or "planning to plan" should be the focus first, an important step that will determine the success of the planning process later.

## 3.5  Planning to Plan[20]

Commitment to strategic planning. In order to be effective, strategic planning should start with a clear national political commitment to the process as well as to its implementation. Commitment from the various organizations involved should also be secured, in particular from managers and boards of governors. Staff should get a sense that they are part of the process from the beginning, through oral and written communication from management.

Actors in the process. As pointed out above, strategic planning is a process of consensus-reaching among different actors who will influence or be influenced by the output of the research system. Thus it is important that all the people who should be involved be identified carefully, as well as their specific function in the planning process.

Steps, approach, expected output and timing. Agreement should be reached on what the planning process will —and will not— involve, and what the output is expected to be; the steps that should be taken, the approach, the expected intermediary products and the timing should be decided upon before embarking into the planning process.

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20) See Pfeiffer (1986:3-6. 49-50); Rocheteau (1989: 2-4).

## 4. STRATEGIC PLANNING AT THE NATIONAL LEVEL

Strategic planning at the national level concerns itself with the elaboration of a national agricultural research policy and strategy for the whole research system. First, some strategic decisions regarding the mission, the size and scope of the research system have to be made; this includes 1) the overall level of resources (financial and human) that should be devoted to agricultural research; and 2) some basic decisions regarding the scope of the research itself.

The decision concerning the scope of the research will, in part, depend upon the country's economic and agricultural development objectives. An important task of planning at the national level is to translate the country's economic and agricultural sector development objectives into a set of agricultural research goals and objectives.

Figure 2 proposes a model for the process of strategic planning.[21] The increasing interest in strategic planning, demonstrated by the abundant literature on the theme, has resulted in a number of models being proposed. A careful review of these models in an attempt to adapt them to agricultural research management shows that they amount to essentially the same, simply differing as to the level of disaggregation of the steps. The order of the steps may also differ slightly, but the essential point is more the issues than the order in which they are addressed, since the process is inherently iterative.

The process begins with an assessment of the present situation of the agricultural research system (i.e., its current objectives and strategy), an evaluation of its strengths and weaknesses and an analysis of its environment. The output is a review or diagnostic of the system.

From there, an ideal scenario for the research system is designed. In analyzing the difference between the 'present' and the 'desirable' future, one gets a measure of the needed changes (gap analysis), in particular the resources and capabilities that are required to bridge the gap, as well as any organizational adjustments. Comparing this with the resources the country can realistically mobilize may lead to a redefinition of the preferred scenario and of a desirable scope for the system. The output of this iterative process is a goal statement which defines the mission, the size and scope of the system, and its objectives.

The goal statement becomes an input in the process of policy elaboration which produces a national agricultural policy and strategy. Such a document specifies the resources that are available to reach the objectives and the required organizational adjustments. Then comes the implementation which is monitored and evaluated. The monitoring and evaluation reports serve as an input for the planning process.

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21) The model proposed here owes a great deal to that of Stoner and Wankel, (1986:124-5). Sachdeva (1988b), inspired by a number of authors writing on strategic planning, also developed a model for agricultural research planning, elements of which were used here.

## 4.1   Assessing the Current Status of the NARS; Determining Strengths and Weaknesses

The situation of the NARS can be assessed along four major lines:
1) the stated and actual mission of the research system; 2) the
consistency between the goals and objectives of the research system
and those of national economic development; 3) the organizational
structure of the system, and the various mechanisms, organizational
devices and linkages: are they in accordance with and do they
further the goals and objectives of the system? 4) the level and
complementarity between resources (financial, physical and human):
do they enable the system to fulfil its objectives and operate
efficiently?

### The Mission of the System

There is often a gap between the stated, or expected mission for the
system, and the actual mission pursued by its scientists.  While the
research stakeholders may expect the system to be at the service of
agricultural development, researchers may pursue scientific
objectives within their disciplines and may aim at contributing to
international advancement of knowledge.  Thus program contents need
to be evaluated as to their relevance for the country's
circumstances.

### Consistency Between Research Objectives and National Development Objectives

This is a crucial moment in the evaluation of the current situation
of the research system.  Agricultural research objectives, as
expressed in the various programs of the institutes, are checked for
consistency with national development objectives.  All too often
research objectives are elaborated in isolation from national
development goals.

This leads to evaluating the process of formulating agricultural
research objectives.  It involves assessing for efficiency: 1) the
linkages between research and policy-making; 2) the methodologies
and, particularly, the assumptions behind the models that have been
used (if any) for priority setting; 3) the functioning of the
mechanisms that have been put in place for planning, as well as
mechanisms that are part of the management control system and are
useful to the planning process (see infra.).

Effective communication between policymakers and researchers can
also affect the extent to which research policies are in tune with
national development objectives.  The informal interactions, as well
as the more formal linkages, need to be assessed.

### Structure and Organization of the Research System

These will determine the system's capacity to achieve its designated
objectives. The main issues evolve around the number of institutes

Figure 2: Strategic planning model and outputs at the national level.
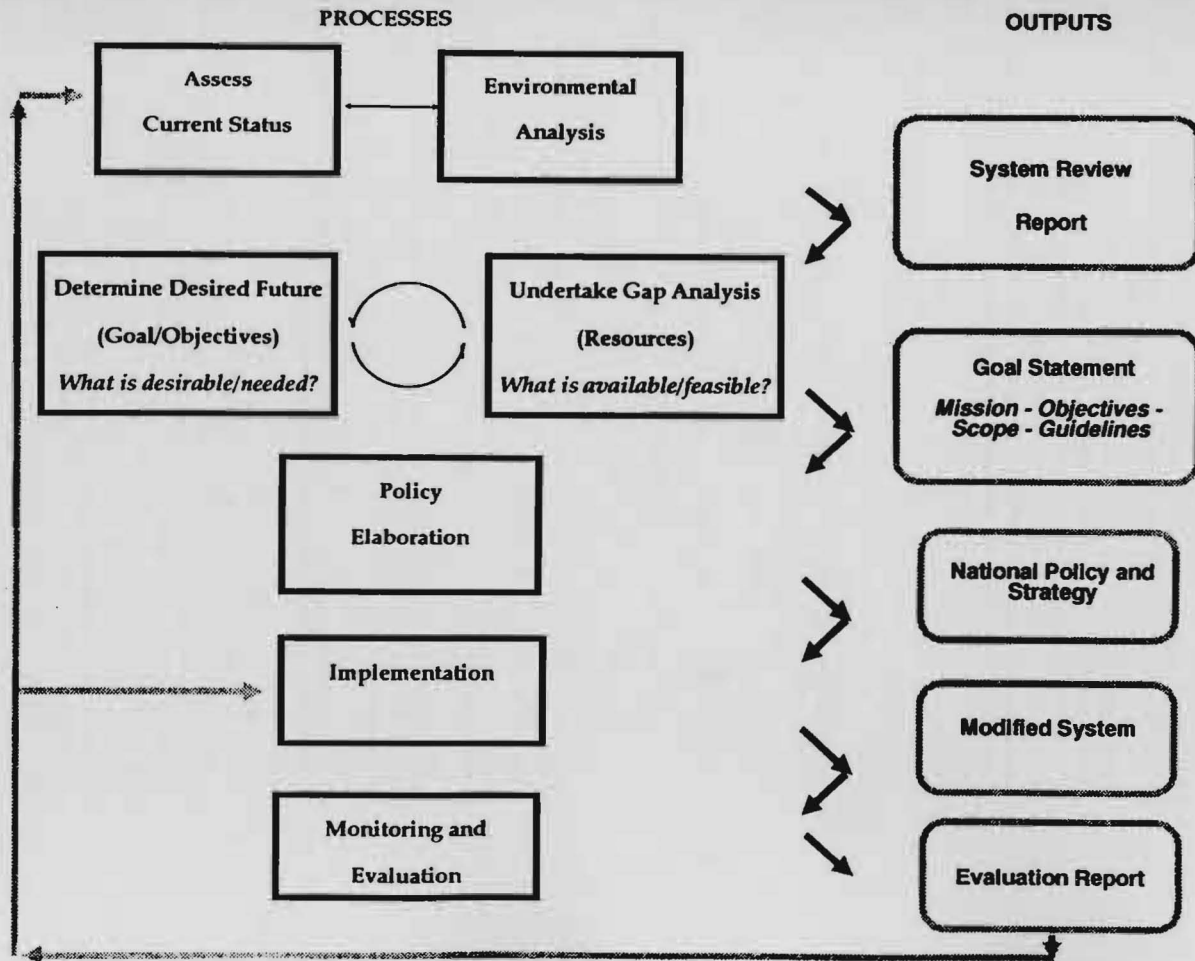
or departments, which entity they will be placed under, their degree of autonomy (or control), the degree of centralization or decentralization of the system (administratively as well as geographically) and the degree of unification or coordination within the system.

Other questions deal with the organization within the system necessary for the performance of planning, monitoring and evaluation and inter-institutional coordination functions. Monitoring refers to the periodic reporting and analysis of data on key research indicators. The performance of the system is thereby measured against the objectives set and the intermediary output expected in relation to a plan. Thus it provides the necessary information for corrective action. Evaluation is concerned with issues of relevance and quality of research program and impact of research outputs. Both generate information useful for management purposes and for future planning.

Sound planning, monitoring and evaluation rest first and foremost upon a good information system on the research programs and projects, the resources allocated to them, and their results. Ineffective information management results in duplication of efforts, lack of continuity in building knowledge bases and inefficiencies that limited-resource systems cannot afford.

Well-functioning linkages between the institutes within the system are important to avoid duplication and a gap in research coverage, and to capitalize on the complementarity of research efforts. These are particularly difficult to manage in the case of autonomous or semi-autonomous institutes or, in the case of departments, under different ministries. The most difficult linkages may be between the private and the public sector and between the universities and the research institutes, as these may operate with different value systems and a different mission.

Thus, the various mechanisms and organizational devices (bodies or committees) that are put together for these specific tasks need to be assessed. To what extent are these coherent with, and do they further the goal of the system? The composition, mandate, functions, and degree of authority of the various bodies need to be reviewed for strengths and weaknesses.

## Level and Complementarity of Resources

Is the level of resources for the actual scope of research adequate? Equally important is the appropriate balance between personnel, operating funds and facilities, and within personnel, between scientists and support staff. There are too many facilities without programs, too many researchers with insufficient funding to adequately carrying out their research. Does the system have enough scientists with an adequate level of training?

## 4.2 Environmental Analysis

Environmental analysis has three purposes: 1) to understand the economic, socio-cultural and political characteristics of the environment as it affects the functioning of the NARS and its ability to meet the designed objectives; 2) to know and understand its stakeholders and its clients; 3) to evaluate the present and future markets (domestic and international) for the country's agricultural products.

### The Economic, and Socio-Political Environment

Agricultural research will ultimately be evaluated by the adoption rate of new or improved technologies and the impact of the adoption on the economic development of the country. Adoption rates are determined by the relevance of the technology for farmers' needs and constraints, and further, by national economic and agricultural policies.

In particular, farmers' decision to adopt a technology will be based in part on the costs of using the technology in relation to its likely profit. But producer prices for a commodity (level and stability) in relation to the prices of other products and to consumer goods, will also be decisive. Policies in areas beyond the agricultural sector, such as import-export, fiscal, monetary and foreign exchange will determine the relative price levels. These are often affected by political decisions to favor urban consumers, or to protect the industrial sector, thereby turning the terms of trade against producers and the agricultural sector.

Other determinant factors in the technological diffusion and adoption rate are an effective extension system, in turn affected by its linkages with research, by the reliability of input delivery and services (whether performed by the public or the private sector) and by an appropriate infrastructure. Reviewing the performance of these sectors should be part of planning at the national level, because there is little sense in promoting the generation of new technologies if rural infrastructure will not support their adoption.

Entering into the details of an action plan for an adequate agricultural research environment would be much beyond the scope of planning for agricultural research. Nevertheless, the deficiencies that stand in the way of research contributing to its full potential to agricultural development should be brought to the attention of the policymakers who are dealing with issues in the realm of economics and finance, agricultural and rural development, and trade.

### The Clients

The environmental analysis is also concerned with the ultimate clients of agricultural research, the producers, and their

characteristics. The disparities between socioeconomic categories in rural communities are such that technology adoption capabilities can vary substantially, depending on the input content of a technology. For example, new or improved technologies requiring high level of inputs are not likely to be adopted by resource-poor farmers. Thus farmers should be identified according to their relative endowments (land, water, labor, and capital), and their access to inputs, markets and services such as credit; this in order to tailor research program objectives to the needs and constraints of the research users.

## The Stakeholders

An analysis of the stakeholders of agricultural research is also necessary in order to identify their interests and expectations. By stakeholders is meant the groups whose activities are likely to affect the research system, or conversely, the activities of which will be affected by the output of the research system. They are not the direct users of research. They are: 1) the financers of research (government and donors); 2) the groups that make up the environment of agricultural research, such as, for example, the rural banks (their credit scheme will influence the adoption of a technology); the agriculture-based industries and import-export firms (their absorptive capacity of agricultural output will also be a determining factor); and all agriculture-related services; 3) the consumers.

Given their role in allocating resources to research, governments and donors are important stakeholders. Hence, part of the analysis is to identify the information that would enhance the commitment of policymakers and provide them with the necessary justification to increase resources for agricultural research. Another part would be to detect the policy-making activities for which policymakers would need and welcome the input from research, thereby giving research a higher profile and demonstrating its value. As for donors, a solid understanding of their priorities and requirements for research funding will help to develop a strategy to attract the available external funds.

The generation of technologies that will lead to a production increase for export or for processing, or to the development of new products, should only be envisioned if:

- rural services can be expected to handle the surpluses or new products adequately and deliver the additional inputs;

- import firms and/or local manufacturers can produce the necessary inputs;

- banks can increase their lending scope in support of higher activity levels.

Thus, identification of the actions in the system and close consultation with them is essential before envisioning the development of new technologies.

Finally, consumers will be affected by technological innovations, either through a change in relative prices for agricultural products or their quantity, quality and diversity. Different consumer groups will be affected differently, depending upon their purchasing power and patterns. An estimate of demand elasticities is needed to evaluate the likely effect of a supply increase on prices.[22]

## Domestic and International Markets

The agricultural research policy and strategy are also built upon the results of market prospects, both domestic and international. Normally, such studies should have been undertaken as part of the process of elaborating the country's economic development policies, prior to the elaboration of the agricultural research policies. For each present and potential speculation, market growth, as well as market share and the country's comparative advantage need to be evaluated, so as to take advantage of changing demands and opportunities.

When new products are being considered, consumer preferences and their purchasing patterns and constraints need to be understood and analyzed carefully in order to determine the necessary characteristics of the products. Too often, so-called "good" products have been developed only to be found unacceptable by the consumers. These data and information are then used to evaluate the potential return to research investments.[23]

## Private-Sector and IARC Contribution to Agricultural Research

The issue is to evaluate the actual and potential contribution of the private sector to agricultural research, either in-country or through the importation of ready-made foreign technology (such as improved seed produced by multinational corporations). Equally important is the possibility of borrowing technology from the IARCs. The purpose is to define the best mix of public and private research, and how much foreign technology should be imported. From there the appropriate niche for public-sector research can be determined, as well as the policies which will best encourage private-sector research and technology transfer.

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22) By price elasticity of demand is meant how much the demand for a product will change as a result of a change in price. If a product is price inelastic, the demand for it will tend to be stable with respect to price; conversely, if a product is price elastic, the demand will respond to price change. How responsive the demand is with respect to prices is measured by the elasticity.

23) In their system approach to research resource allocation, Pinstrup-Andersen and Franklin (1977:422-3) are discussing market data requirements.

## 4.3 Determining the Desired Future: Mission and Objectives

Mission of the system.

"Mission" is understood to mean what the country is expecting from its agricultural research. A NARS's mission can be either 1) to support the development of the country's agricultural sector; 2) to contribute to the advancement of agricultural science; or 3) to provide the basis for the elaboration of agricultural development policies and development projects; that is, to be a service to policy-making. The mission assigned to the system will determine many of its functions: obviously, it determines, in part, the content of the research programs. Beyond that it will determine the criteria for rewards and promotion of the scientists and the organizational structure of the system, in particular the kind of mechanisms that will be put in place for planning, monitoring and evaluation, and reporting.

## Societal Choices and Agricultural Research Objectives

Agricultural research policies are intended to influence the direction of technical change and the characteristics of technological development in the agricultural sector, so that they are compatible with social goals. Determining agricultural research objectives is a process that merges the overall socioeconomic and agricultural development objectives of a country with the agricultural science and technology policy, taking into account the availability of resources and their relative costs.

The process of defining research objectives for the agricultural research system incorporates some major societal choices.[24] These are usually made in a much wider development context than the elaboration of a national agricultural research policy. Some of the choices that are likely to be relevant for agricultural research are the following.

i.   Target Groups.  Should agricultural research have as its primary clients: 1) the poorest, most marginal farmers, for whom increasing production is a matter of survival; 2) the intermediate farmers, who are perhaps more likely to be able to improve their productivity; 3) the agro-industrial/large-scale producers, whose production may be crucial to improving the country's balance of payments; or 4) an appropriate combination of all three, depending on the availability of resources and commodities?

ii.  Priorities Among Differing Agro-Ecological Zones.  Should research concentrate on high-potential or marginal regions, the colonization of unused land or the development of densely populated agricultural areas?  Decisions on these issues are not independent

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24) Societal choices are also discussed by Rocheteau (1989). One of the most comprehensive models for tying agricultural research objectives to social goals such as growth, equity and security has been proposed by Pinstrup-Andersen and Franklin (1977).

of the agricultural sector's expected contribution to the overall
development objectives, nor of the decisions concerning target
social groups.

iii. Distributional Issues among Producers. The adoption of new
technologies is likely to have important side effects on the social
structures, depending upon the characteristics of the technology and
on the socioeconomic and institutional environment in which it is
introduced. Thus, choices made on the ways to release production
constraints and increase agricultural productivity are critical.
Obviously, choices concerning the preferred characteristics of
technological change will be determined in part by the priorities
among target groups and target regions (1&2 above).

Distributional effects are the result of: 1) technological
innovations being adopted soon after their release or later; 2)
relative land, water, capital and labor endowments; and 3) different
access to inputs, markets and services.[25] Early adopters will
benefit from a new technology before increased production leads to a
fall in producer price which will be the case if prices are not
sustained by an increase in demand for the product.

New technologies will affect the unequal distribution of productive
assets and income, by changing the returns to factors of
production. For example, with unequal land distribution,
labor-saving and land-using technologies will lead, other things
being equal, to the displacement of agricultural laborers, to the
subsequent impoverishment of the most marginal farmers and to the
increase in rural-urban migration. In such situations, if the
clients of the agricultural research system are the small farmers,
the generation of labor-using and land-saving technical innovations
may be preferable. In addition, low-income farmers have less
capacity to withstand risk: they will choose a lower-profit but more
secure technology over a high-profit but risky one. This may affect
adoption rate and introduce further income inequalities.

Agricultural research is not the most efficient way to address
social inequalities as compared to other policy measures. Indeed,
"to attempt to meet distributional objectives through research
allocation rather than redistributing of the land is analogous to
moving the piano to the piano stool" (Mellor 1977:482.) However, it
is almost inevitable that it will have an impact on social
differentiation. In formulating choices for a technological path,
the biases implied due to the particular socioeconomic circumstances
have to be highlighted; not only for their impact on the adoption
rate, but also for the potentially undesirable effects on the
distribution of income, employment, rural differentiation and the
socio-political unrest they could trigger off, so that appropriate
complementary policies be instituted.

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25) The literature on the distributional effects of technological change, is huge and
controversial; Barker, Herdt and Rose (1985) review the literature on the income
effect of modern varieties technology in Asia. See also Hayami and Ruttan (1985:
chapter 11). For the implications for research resource allocation, see Binswanger,
and Ryan (1977:224-226); Mellor (1977); and Schuh and Tollini (1979).

iv. Distributional Issues between Producers and Consumers.[26] A
new or improved agricultural technology should lead to increased
production at lower costs per unit. Therefore, depending upon the
price elasticity of demand for the product, both consumers' and
producers' welfare should be increased: this through consumption of
larger quantities at lower prices per unit for the former; the
selling of larger quantities and/or lower production costs for the
latter that can more than offset the fall in prices.

However, in the case of inelastic demand for a product, the decline
in producer prices, when supply increases, will not be offset by
increased demand. Except for the early adopters, producers' income
will be reduced, and consumers will reap the benefits generated by
falling prices. The poorest consumers are the ones who will gain
the most, since poor people spend a larger proportion of their
income on food.

The agricultural research objectives thus may be quite different
depending on whether the objective is to maximize producer income
and/or employment in the agricultural sector, or if it is to
increase the welfare of the poorest consumers. The possible
conflict between lowering prices to consumers and increasing farmers
welfare has to be acknowledged in elaborating research objectives.
Concentrating on products for which the demand is likely to go up
when prices decrease or on products with export potentialities in
addition to the domestic market may be a solution if the objective
is to increase farmers' welfare. However, these may not be the
produce that the poor consumers need the most nor the ones they can
afford to buy. In low income countries, however, there is less
potential conflict as to the distribution of benefits between
consumers and producers: most producers are consumers as well.

The above discussion does not pretend to analyze all the potential
distributional effects of technological change under various
circumstances. The intention is only to bring to the attention of
policymakers some of these, so that they be aware that adequate
policy measures (price policies, fiscal and monetary policies) be
taken accordingly.

v. Environmental Considerations.[27] Should the control of
environmental degradation and the stabilization of agro-ecological
systems take precedence over an immediate increase in agricultural
production? Given the degradation of natural resources, in the past
often exploited without much concern for their reproducibility, the
sustainability of production systems is becoming increasingly
important. Certain technologies, if used inappropriately, may
destabilize fragile systems. It is likely that concern for
sustainability will have increasing research implications, both
directly and indirectly, in the future.

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26) On this issue, see Binswanger and Ryan (1977) and Hayami and Ruttan (1985: chapter
    11).

27) See Treitz and Narain (1988)

## Translation of Agricultural Development Objectives into Research Objectives

National development goals and agricultural sector objectives are normally spelled out in development plans. Agriculture has commonly been expected to contribute to the overall development objectives in several ways:

a) to increase consumer welfare through increased supplies of food and to improve the nutritional status of the disadvantaged;

b) to contribute to foreign exchange earnings through production for exports and to support the development of the domestic industrial sector by providing raw materials and a market for the domestically manufactured goods;

c) to increase income and employment in the agricultural sector;

d) to conserve the environment and the country's natural resources;

There are two problems with this set of objectives when it comes to basing the elaboration of agricultural research objectives on them. First they may be in conflict with each other. For example, under some circumstances the objective of increasing domestic food supplies may compete with the objective of increasing production for exports. As highlighted above, increasing food supplies through productivity improvements may lead to declining producer prices and a reduction in farmers' incomes; conversely, the objective of rural employment can lead to the adoption of less efficient production techniques and an increase in the cost of food to consumers.

Another problem is that these goals are so broad that they can accommodate any research activity. It is impossible, from the above to decide the extent to which research should emphasize:[28]

1) increasing production for import substitution or for export; for food or industrial crops;

2) the diversification of production or development of current products;

3) improving the quality of products;

4) the savings of inputs;

5) the improvements in transportation, storage, and processing;

6) economic policy and institutional development.

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28) For a discussion of this issue, see for example Schuh and Tollini (1979:14-22).

i.   Increasing Agricultural Production. Though increasing output is generally the primary goal of agricultural research, resource allocation will be quite different if the focus is on products for exports, for import substitution or raw material for the industrial sector. Most countries stress the importance of increasing food availability, but this can be achieved through various ways in addition to research on food crops: 1) increased production for exports, which can finance the import of food products; 2) research on non-food crops, which by increasing resource productivity would release land and labor for the production of food crops.

ii.  Diversification of Production. Similarly, research efforts could be directed at developing new products to exploit emerging market potentials (either domestic or external); or decisions can be made to scale down research on those crops, the marketing potentials of which are dwindling, either as a result of new competitors or the development of substituting products.

iii. Improving the Quality of Products. Research on the improvement of product quality also aims at capturing a potential market and increasing rural incomes.

iv.  Input Saving and Resource Conservation. Input costs to improve agricultural production are becoming a matter of concern for many developing countries. Increased input costs in relation to product prices make it difficult for farmers to adopt new technologies. Faced with financial difficulties, most governments can no longer afford to subsidize inputs. Finally, the high foreign exchange component of inputs is a problem for countries already faced with balance-of-payments deficits. Hence, the challenge to agricultural research might become to develop varieties that are more responsive to fertilizer application or that can make better use of soil or air (nitrogen fixation) nutrients.

Another issue is the one of saving resources, in particular soil and water. Varieties that make more efficient use of water, either under rainfed or irrigated conditions, need to be developed. Though the ultimate result from resource savings may also be agricultural growth, the research content is quite different, whether the emphasis is on increasing agricultural output as the prime objective or whether it is to make more efficient use of resources.

v.   Improvements in Transportation, Storage and Processing. Here, again, research on these issues may result in a reduction of waste and spoilage, and a more efficient distribution system, with the result that more produce reaches the consumers, the export markets or the industries.

vi.  Institutional Environment and Economic Policies. As noted earlier, the economic and institutional environment plays a key role in the adoption of technological innovations. Thus

research on appropriate institutions and policies for the
development of agriculture can go a long way towards the
ultimate goal of increasing agricultural production, especially
when undertaken in complementarity with biological research.

Thus it is essential that the various agricultural development
objectives be detailed and priorities be set in order to resolve the
potential conflicts between them. As much as possible, objectives
should be quantified to give them operational meaning. In
particular, the targets for food and export production and raw
material supply to industries should be specified before
agricultural development objectives can be translated into research
objectives.

Determining research objectives adds another dimension. It answers
the question: What is the potential contribution of national public
research to the attainment of each agricultural development
objective? This may lead to research objectives being somewhat
different from agricultural development objectives. For example, a
country may well have as its most important objective the increase
of basic food, say rice, without the development of rice
technologies being the major agricultural research objective; this,
due to the fact that technologies may already be well known and that
the major bottleneck is extension or delivery of inputs or
transportation; or else, technologies may already exist, developed
by institutions other than the national research system.[29]

## 4.4  Gap Analysis: Resources, Capabilities and Organization Required

Based on the mission and objectives assigned to agricultural
research, the evaluation of the current situation of the research
system, with its strengths and weaknesses, and the analysis of its
environment, it is possible to proceed with a comparison between the
actual and the desired situation. The gap between present and
desired achievements (outputs and services), followed by the added
resources required (physical, financial and human), as well as the
weaknesses that need to be addressed in order to arrive at the
desired situation, are all identified. Needs for organizational
adjustments and cultural change are also included in gap analysis.

Resources and Capabilities: Determining the Size and Scope of the
System

Given the desirable output of the system, the resources that would
be needed are specified. This ideal situation is compared to the
level of resources the country is prepared to allocate to its
agricultural research. When discrepancies occur, either some
additional funding needs to be secured or the objectives need to be
revised.

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29) Such is the case of the Philippines: for its rice research, it complements the rice
program at IRRI with mainly adaptive research. (Personal communications: Emil
Javier and Dely Gapasin).

Determining the optimal level of <u>sustainable</u> effort for agricultural
research for the particular circumstances of a country is a thorny
exercise. Because of the long time span required for generating
definite research results, the sustainability of investments is
more important than obtaining high funding levels that cannot be
sustained over time. It is therefore important to determine the
level of funding, including external funding, that the country is
prepared to support, at least in the medium term.

As discussed in chapter two, the rationale for funding levels that
mirror the levels of developed countries is far from having been
established. An appropriate funding level will by and large depend
upon the particular circumstances of a country, including its
overall financial capabilities, its level of institutional
development and the availability of qualified scientists.
Therefore, a comparison with countries experiencing 'similar'
circumstances is a better starting point.[30]

Where there are presumptions of underinvestment, past return to
investment in agricultural research can be measured to argue for
higher and more appropriate levels of funding.[31]

Beyond the overall level of funding, the concern should be the
appropriate balance between expenditures on equipment and
facilities, personnel and operating funds. An appropriate balance
between scientists and support staff is also needed. Several
measures of resource allocation can be used:

<u>Number of scientists.</u> It is usually expressed per billion of Ag.
GDP or per million ha of arable land;[32]

<u>Operating funds per scientist.</u> This defines the minimum operating
funds (including recurrent costs on facilities and equipment) that
are needed per scientist to carry out research work. Obviously,
this will depend according on the type of research. However, each
country needs to determine an average minimum funding level, as this
will be one of the bases for arriving at a well-balanced level of
funding between salaries and operations.

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30) For a discussion of public support to agricultural research, see Elliott and Pardey
(1988); Pardey, Kang and Elliott (Forthcoming). Ruttan (1987) presents the various
sources of financial support and ways to mobilize them. Rocheteau (1989) discusses
some of the considerations other than Ag.GDP percentages to be taken into account to
determine the level of funding.

31) A number of methods are used to evaluate research investments. They have been
classified under: 1) the inputs saved approach; 2) consumer and producer surplus; 3)
production function; 4) impact on national income; and 5) nutritional impact. The
economic surplus approach, often known as rate-of-return analysis, compares the
reduction (in unit costs) that comes about as a result of a technological
innovation, with the costs of adopting the innovation. The share of benefits
between consumers and producers is estimated. The production function approach
estimates the farm output as a function of various factors, including research
expenditure. Statistical procedures are used to separate out the impact of research
effort on output and to control for other variables that may be affecting either the
research output or agricultural production. For a detailed analysis of these
methods, their advantages and disadvantages, and where most appropriate, see Schuh
and Tollini (1979) and Shumway (1977).

32) Figures for adequate level of human resources are scanty. Using the
developed-country figures could be as misleading as the figures for the level of
funding.

## Organizational Structure

The existing organizational structure may not be the most
appropriate one for the implementation of the new research
objectives.  In such situations, organizational adjustments may
become necessary, and can include changing the entities to which
institutes are responsible, modifying the  degree of control over
the institutes towards more or less autonomy, changing the degree of
centralization or decentralization, merging or splitting institutes,
creating new institutes, reinforcing research at the universities,
and privatizing parts of the research system.  Various scenarios for
reorganization may be envisioned.

## Linkages Within the System and Between the System and Policymakers

Existing linkages may also be inefficient.  Ways to improve the
functioning of theses linkages will be designed as part of system
planning.

### 4.5  Elaboration of a National Agricultural Research Policy and Strategy

Once the level of funding has been brought into balance with the
objectives assigned to the system, the national agricultural
research policy and strategy can be put together.  It includes a
well-defined mission for the system, a set of research objectives
and broad priorities for the design of research programs, and the
resources that will be applied to them:  financing, staffing,
physical facilities, and the adjustments in organizational structure
and linkages deemed necessary.

The research objectives and the socioeconomic development objectives
of the country also serve as the basis for allocating resources
among research programs.  Making choices between different patterns
of resource allocation is a thorny exercise,  which requires
experience, intuition and a solid knowledge of  agricultural
research and agricultural development.  To complement informal
expertise and improve the resource allocation procedure, a number of
priority-setting methods have been developed.  They include:[33]

> congruence, which allocates research funds to commodities in
> the same proportion as their existing contribution to the AgGDP;
>
> domestic resource cost ratio: it calculates a country's
> comparative advantage over other producers in the world market;

33) It would be beyond the scope of this paper to enter into the details of each of the
priority-setting techniques, their advantages and disadvantages, and which ones to
choose, depending on the situation and the purpose. Among the voluminous literature
that has been written on the subject, I refer the reader to Schuh and Tollini
(1979); Anderson and Parton (1983), Norton and Davis (1981), Norton and Pardey
(1987) and Contant and Bottomley (1988). The list presented in the text leaves out
mathematical programing and simulation models, as they appear to be the most
difficult to implement at this stage.  ISNAR is presently working on developing
priority setting tools based on benefit-cost analysis with and without an economic
surplus perspective, and on scoring models.

checklists and scoring models: they establish a list of
multiple criteria (and weights between them in the case of
scoring models) for ranking research objectives, commodities or
research areas;

benefit-cost analysis, including consumer-producer surplus
analysis. These calculate a benefit-cost ratio, an internal
rate of return and net present value for alternative patterns
of research investments. They are based on researchers'
opinions to determine an estimate of research impact, the
probability of research success, the expected rate of research
adoption and the distributional implications of technological
adoption.

Priorities between objectives and programs serve as the basis for
resource allocation among institutes. For example, if the highest
priority has been given to reducing the balance-of-trade deficit
through agricultural export revenues, resources will be allocated
with priority to the institutes carrying out research on export
crops. Conversely, if priority is given to achieving basic food
security, the resources will be directed to research areas of
relevance to this issue, from research to increase local staple food
production to improve storage, marketing and/or constitution of
security funds. This also applies to political and social motives:
e.g., developing a particular region, or giving particular attention
to a specific ethnic group. For example, a Latin American country
may decide to give priority to the development of the Altiplanos
and, therefore, may allocate a corresponding budget share to
highland agricultural research.

## 4.6 Implementation of the Strategy

A distinctive characteristic of planning at the national level is
that the actual implementation is passed on to the institute level.
The national policy and strategy serves as an input to the planning
process at that level.

Beyond providing guidelines for the institutes, the national
agricultural research policy and strategy includes documented
recommendations for policies to foster the adoption of the expected
new technologies: price, import-export, monetary, marketing and
extension policies. It also contains recommendations as needed for
organizational readjustments and linkage improvements at the
national level.

For the ministries of planning, or economics and finance, it
provides information useful when elaborating national development
plans, sectoral policies and allocating resource. For donors, it is
also a reference for proposing special projects and for their own
allocation of funds. It is thus the basic document for negotiation
purposes with donors. Finally, for implementing ministries in the
agriculture sector, it becomes one of the inputs for the elaboration
of their own strategy.

## 4.7 Monitoring and Evaluation

The extent to which the implementation process at the level of the institute will be monitored from the national level depends on the structure of the research system. For a centralized system with a well—defined apex, the monitoring will begin with the review of the institutes' strategic plan, checking conformity with national policies and strategies. Once the plans are approved, achievements will be reviewed periodically in relation to intermediate targets, with the extent, nature and reasons for deviations documented and, when necessary, corrective actions decided upon.

In the case of a system without an apex, monitoring may be reduced to only a flow of information between the research system and its stakeholders. However, even with a loose structure, some feed-back mechanisms should be institutionalized to inform policymakers of the research results, progress or difficulties at determined intervals.

## 5. STRATEGIC PLANNING AT THE INSTITUTE LEVEL

Strategic planning at the institute level will vary considerably
depending on the particular organizational structure of agricultural
research in the country. In centralized and monolithic systems it
is likely that most of the decisions will have been taken at the
national level, leaving very little leverage to the institutes,
other than straightforward implementation. By contrast, in
extremely decentralized systems, with a multiplicity of intervening
institutions and a loose policy-making process at the national or
system level, the agricultural research policy may amount to little
more than very broad guidelines; in such a situation, most of the
planning will take place at the institute level. Hence, in reality,
the institute planning exercise could encompass more (or less) than
what is presented hereafter, depending on the specific circumstances
of the country.

The strategic planning for the institute that has been adopted here
places the formulation of long-term programs within the institute.
Thus, it presupposes that most of the activities within the program
will be carried out at the institute, or at least that the
leadership of the program is clearly the mandate of the institute.
However, this does not preclude that other institutions in the
country may carry out parts of the program. To the contrary, one
can envision situations where long-term programs are formulated at
the national rather than the institute level. For example, if many
institutions are undertaking research, with none carrying out the
bulk of it, it may be necessary to formulate programs at the
national level in order to coordinate activities between the various
institutions and allocate resources accordingly.

The sequence of steps for elaborating the plan at the institute
level is quite similar to that at the macro level. Major
distinctions are to be found only at the two ends of the process
(see Fig. 3). First, the research goals and mission of the
institute are already defined by the national agricultural research
policy and strategy. These are therefore discussed within
environmental analysis. Second, the institute is concerned with the
actual implementation of the policy and strategy; a detailed action
plan has to be prepared over a period for which resources are fixed,
and the major trends in the environment are known.

A further difference is that at the institute level, each step of
the process starts from the results of the same step at the national
level and proceeds from there into the specific circumstances of the
institute, with an added degree of detail. For example, the
environmental analysis at the institute level assumes the results of
the environmental analysis at the system level, and focuses on the
part of the environment which is of direct concern for the
institute. Similarly for the research stakeholders.

### 5.1 Analysis of Current Status

The current objectives, strategies and performance (scientific
output) are assessed in order to identify the institute's strengths

and weaknesses. In particular, the resources (physical, human and financial) and the scientific potential need to be assessed. One of the critical issues is the balance of resources allocated to each program, and the level of these resources. Different activities require different minimum levels of investment and support to ensure that research activities will have the expected impact. Investments, below that critical level, risk being unproductive, although it is often the case that, in the absence of priorities being set, research is being carried out in all required areas, even if it is with very limited resources for each.

Also belonging to this sequence is the evaluation of the effectiveness of the current structure to carry out the various functions the organization is supposed to perform. The following management functions need to be evaluated: planning, coordination, communication, information collection and processing, monitoring and evaluation, annual programming and budgeting, reporting and accounting.

Another important component of the evaluation is to determine how effective the present program organization is in terms of achieving the expected objectives. To what extent should research activities be organized along 1) product-lines; 2) resource/factors of production (soil and water resources, mechanization, labor, and management); 3) stages or levels in the production-to-marketing sequence (i.e., inputs, farm production, post-harvest technology, markets, and community services); 4) disciplines; 5) production systems; 6) themes; 7) problems; etc... ?

An organization strictly along discipline lines, for example, will tend to emphasize production of research results for the advancement of science. And yet, some regrouping of scientists by discipline in a kind of support department may be necessary, as not every program can afford a full-time specialist in all required scientific areas.
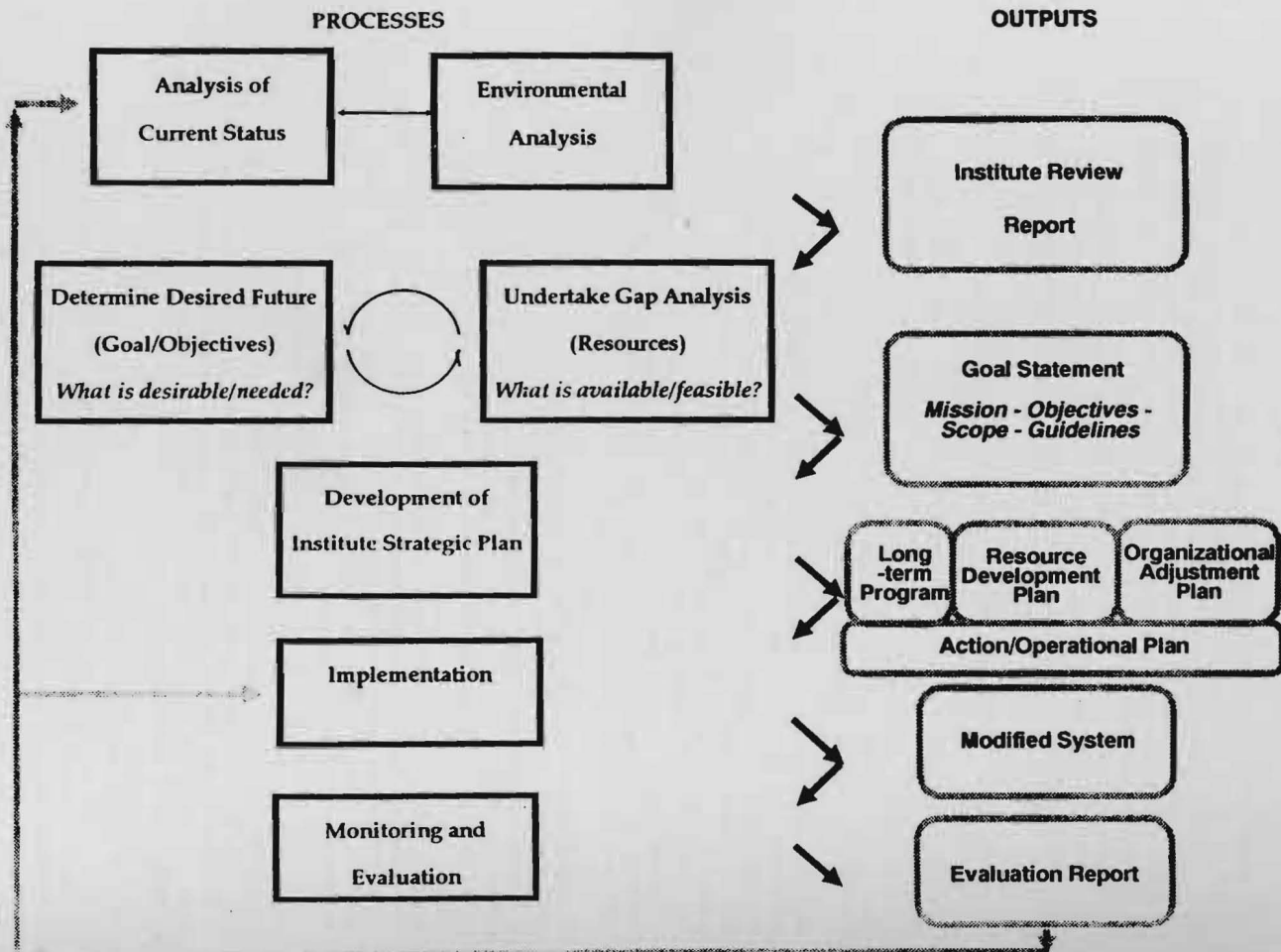
Programs by product lines tend to ignore the complex and heterogeneous natural and socioeconomic conditions in which many farmers operate. Such an organization may bias the selection of research activities towards providing technologies that only the farmers who have the capability to make the necessary adjustments can adopt. Introducing an organization based on production system to substitute for production lines as the basis for assigning research priorities has been suggested. However, such an organisation, if it facilitates the transfer process by generating technologies tailored to the needs and constraints of farmer groups and agro-ecological zones may be prohibitive in terms of financial, scientific and organizational resources.[34]

The solution seems to lie with an integration of the two types of program organization; i.e., the production lines and the production system. It would involve maintaining an organization based on programs by product lines and disciplines for technology

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34) Trigo, Pineiro and Chapman (1982) discuss the advantages and problems of the two approaches to organization: i.e., the product-line or the production system approach.

Figure 3: Strategic planning model and outputs at the institute level.

PROCESSES

OUTPUTS

Analysis of Current Status

Environmental Analysis

Institute Review Report

Determine Desired Future (Goal/Objectives)
*What is desirable/needed?*

Undertake Gap Analysis (Resources)
*What is available/feasible?*

Goal Statement
*Mission - Objectives - Scope - Guidelines*

Development of Institute Strategic Plan

Long-term Program

Resource Development Plan

Organizational Adjustment Plan

Action/Operational Plan

Implementation

Modified System

Monitoring and Evaluation

Evaluation Report

development, but incorporating a production system approach for the selection of research activities and for technology adaptation.[35] This may be obtained through the effective integration of on-station and on-farm activities: though feedback mechanisms between on station and on farm activities, information concerning 1) the needs and constraints of specific groups of farmers and 2) performance of technologies under varying management conditions, can serve as the basis for selection of on-station research activities.

However, this close integration is particularly difficult to establish; in particular, the effective feed-back of information into the planning and priority-setting process for on-station work. On-farm or production systems research often remains isolated in a program parallel to product-line research, due to various institutional management and socio-cultural factors.[36]

## 5.2 Environmental Analysis

This step begins with a thorough in-house review and discussion of the national agricultural research policy and strategy. The goals and mission that are assigned to the institute need to be discussed, understood and agreed upon. This is an important aspect of elaborating the institute plan, organizationally and politically: it helps bridge the national and institute levels in the planning process; it serves the purpose of gathering consensus in-house around a common set of objectives and of giving staff a sense of participation in a national mission.

Environmental analysis at the institute level deals with:

(a)  the economic policies that are relevant to the research mandate of the institute;

(b)  the specific linkage mechanisms with extension services for the diffusion of the technologies developed by the institute;

(c)  the particulars of the socioeconomic and political environment of the agro-ecological zones for which the institute has a mandate;

(d)  the socioeconomic setting of the institute's clients; a typology of the institute's clients needs to be elaborated;

(e)  the stakeholders, including the external donors, with their specific interests, concerns and priorities;

(f)  the linkages with external sources of knowledge and international collaboration.

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35) Trigo, Pineiro and Chapman (1982:32-33).

36) The importance of an effective integration between on-farm and on-station work is highlighted in the study of the nine cases of "on-farm, client-oriented research" undertaken by ISNAR. One of the main issues under study in this project is the appropriate organization for an effective integration. See Merrill-Sands and McAllister (1988); and Ewell (1988).

This last aspect of environmental analysis at the institute level is often neglected. Potential collaboration with research institutions outside the country involves determining: 1) the extent to which technologies produced by the international or regional research centers are appropriate for the particular circumstances of the country and could be borrowed with only some adaptive work needed; 2) the activities that could be undertaken by each party with mutual benefit.

The institute may find it advantageous for certain research areas to focus on testing and adaptive research, in vertical cooperation with international and regional institutions, while concentrating its resources for applied research in areas where technology cannot be directly borrowed. If a commodity is of strategic importance to a country and if basic research in that area is not readily available, an institute may decide to allocate a relatively larger share of its resources to developing fundamental research in that area. Such a strategic decision would have to be supported by decisions at the national level.

Possibilities of horizontal cooperation should also be investigated: institutions from several countries can cooperate towards the advancement of a jointly designed program, each taking part in the scientific responsibilities according to its relative advantage. Careful evaluation of these opportunities will have important implications for the design of program strategies and allocation of resources between programs.


## 5.3  Determining the Desired Future

It includes determining the mission for the institute, which will by and large be determined by the mission assigned by the national level, the institutes' clients and the research objectives that will be pursued.


## 5.4  Undertaking Gap Analysis: Resources, Capabilities and Organization Required

Gap analysis entails a comparison between the current and the desired status of the institute, taking into account environmental conditions. The resources and scientific capabilities necessary to achieve the new or revised objectives, and the organizational and managerial adjustments required to reach efficiency and effectiveness are determined.

The level of resources thus defined is compared to the level allocated by the national agricultural research policy and strategy. The resources allocated to the institute at the national level may not be sufficient with respect to the objectives assigned and the expected outputs. A dialogue then takes place between the institute and the national level; either the objectives assigned to the institute, or the amount of resources allocated, have to be revised.

## 5.5 Elaboration of the Institute's Strategic Plan: Long-Term Program Formulation

The institute strategic plan comprises three components:

1.  the formulation of a long-term research program and its
    translation into an action plan for the short term;
2.  the elaboration of a resource-development long-term plan
    (human, physical, financial);
3.  organizational structural adjustment.

Program formulation is the process by which the goals and objectives
assigned to the institute are translated into specific programs.
An institute's programs will be quite different if the national
priorities are, say, the diversification of agriculture, irrigated
farming and medium-size farmers than if they are food security,
rainfed agriculture, the poorest farmers, and marginal areas.

The process of designing the program involves answering the
following questions:[37]

i.   What are the objectives to be achieved (given at the national
     level)?
     What are the major problems that stand in the way of achieving
     those objectives (stemming from an analysis of the
     agro-ecological and socioeconomic conditions of production)?
     To what extent are these technical and researchable; i.e., to
     what extent can they be tackled efficiently through research
     rather, than through development or policy measures?

ii.  If the problems are researchable, can the constraints be
     removed by using present knowledge and materials?
     How much further could research contribute towards  solving the
     problem?

iii. In order to achieve the objectives, what should be the
     researchable problems to address in priority?  That is, what
     should be the research "path" (for example: soil and water
     management, agronomy, plant breeding or plant
     pathology/entomology)?

iv.  For each of the identified problems,  are there appropriate
     technologies that can be borrowed and adapted to the diversity
     of agricultural situations in the country?
     If no technology can be borrowed, what should be the research
     strategy; i.e., a) how much applied, or even basic research
     should be envisioned; to what extent is collaboration with
     other national or regional institutes, the universities or the
     private sector an option; b) how much laboratory-based,
     station-based and on-farm research is needed?

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37) Answers to these questions will be provided by and large by the information obtained
    from the analysis of the current situation and environment.

v.  What is the likelihood of research success?
    How long will it likely take to produce usable results?
    What is the likely adoption rate of research results?
    If adopted, what can be the expected contribution of the
    technology towards the attainment of the objectives?  This
    provides a timetable for monitoring, evaluation, corrective
    action, and differentiation between short- and long-term
    approaches.

vi. Given the strategy and the technological path chosen, what is
    the critical mass of resources  (staff, material and financial)
    needed?  Are they available?  This will provide a framework for
    matching resources and program objectives, for identifying
    future training needs, etc.

It should be noted that the order of the above questions is somewhat
arbitrary: giving them answers is an iterative process.  For
example, determining what should be the researchable problems to
address in priority (point iii) will be modified by the answer to
point iv, i.e., the possibility of borrowing technology and by the
answer to point v.; that is, the likelihood of obtaining research
results and of technological adoption.

The strategy for achieving the objectives begins to be specified
here.  Resource allocation to the program rests on it.  Within each
program, to permit the maximum output and given the amount of
resources allocated, a division of labor, vertical and horizontal,
as mentioned above, can be envisioned with other research
institutions, domestic and abroad, as well as the universities and
the private sector.

Another part of the strategy is the research approach taken: how
much 'vertical' research (centered on the development of particular
commodities or factors of production) vs. systems research (centered
on the development of production systems)?  Related to this issue is
the question of the extent to which multidisciplinary vs.
monodisciplinary research is going to prevail, and how much
laboratory-based, station-based, or on-farm research is going to
take place.  A choice of multidisciplinary research implies higher
costs of coordination and new attention to team building, but offers
potentially higher pay-off in generating technologies relevant to
the users needs.  An emphasis on on-farm research, also, always will
be more costly in operating funds and scientists' time.  Thus these
choices have direct implications for the level and type of resources
required.

The strategy includes a spatial dimension; decisions must be made as
to where the program should be based (i.e., what will be the main
research stations, and what other research stations should be
involved).  This will lead to considerations of physical
facilities-upgrading, construction, or phasing out.

Once the researchable problems to be addressed in priority have been
decided upon and the strategy defined, the research critical mass
for each program can be determined. By research critical mass is

meant the minimum level of resources (financial and human) needed
per program or research area within programs to be able to expect
meaningful research results. It is a crucial moment of program
formulation: as mentioned earlier, all too often this minimum level
of investment is not achieved, resulting in unproductive research
activities and inefficient use of scarce resources.

If, as calculated from the aggregation of all critical masses, the
required resources do not match the available resources, it will be
necessary to select the research lines that should have priority for
resource allocation.

## 5.6  Translating the Long-Term Program into an Action Plan

Once a strategic plan has been designed, with its research program
and resources allocated accordingly, the next step in the planning
process is to translate those commitments into a detailed plan of
action; that is, the specific research activities to be carried out
over a period for which the resources are known and the environment
is predictable; generally not more than three to seven years. This
also corresponds to the time span required for research activities
to begin yielding results.[38]

While the impulse for the elaboration of the strategic plan is with
the institute managers, designing the action plan begins with the
researchers at the level of the research station. The process of
formulating a short-term plan falls between the research station and
the headquarters level, depending on the size of the research
organization. It is generally conceived and planned under national
program coordinators, but the process starts at the research station
where projects should be reviewed under the program coordinator's
leadership.

Within the framework given by the program specifications, each
researcher, or group of researchers, presents a research project. A
research project can be considered the basic planning unit at the
operational level. It is often a multi-disciplinary undertaking
involving a number of scientists and technicians, trained in
different disciplines, working within the same workplan, and under
the leadership of one of the project members. A project is a
coherent set of operations, with a rationale, a goal, a clearly
defined set of objectives, a plan of action for achieving those
objectives, a limited time frame for execution, specific outputs
which can be measured against initial objectives, and a budget
defining human resource inputs and direct operation costs (including
all inputs required for project implementation).

The review process for the projects is extremely important, to
ensure the preparation of a sound action plan. It should be set up
so as to ensure that: (1) researchers have clear project objectives,
in accordance with the overall program goals and objectives; (2) the

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38) The process of program formulation has been given special attention by Dagg and
Haworth (1988). This section borrows from their text. See also Jain (1989:6,
28-31).

experiments and treatments chosen are expected to produce outputs relevant to the clients' needs and adoption capabilities; (3) these are quality experiments that will penetrate to the core of the problem with minimal effort; and (4) they are designed with scientific and statistical care so that solid conclusions can be drawn. The researchers should have these criteria in mind when designing their projects.

Once the projects have been approved at the level of the research station, they are aggregated by programs at the institute level for final review and approval. Priorities have been set between programs, at the strategic planning level. However, within a program there is still a wide range of themes or research areas and their associated activities and experiments, from which the most relevant and effective ones must be chosen and assigned priorities.

Some of these choices are made by the researchers, with the assistance of a review committee, at the level of the station (see Chapter 6). However, when projects have been aggregated by programs, and after they have been checked for congruence with the program objectives and strategy, choices still have to be made among them at the institute level, to be certain resources are sufficient to fund all proposed projects.

Hence, similar to the national level, where priorities had to be set among research objectives, and between product lines or research areas, priorities also need to be set at the program level, but this time between projects. Among the models that can be used to prioritize between commodities or research areas, only the checklists or scoring models, and the benefit-cost analyses techniques are appropriate for prioritization within programs.[39]

## The Annual Program of Work and Budget

The preparation of the program of work and budget is not part of planning per se: it is an update of the action plan. The results of current research activities will often dictate the need for modifications for the future ones. Furthermore, even when there is agreement at the policy level to committing resources to a three- or five-year plan, the reality in most countries is that budgets are formulated on an annual basis, and that allocated funds fluctuate. Part of the annual program of work and budget is the preparation of a detailed program budget, linking each activity to the resources required and available: operational costs, staff time (including all support staff), the use of land, equipment and facilities. Information recorded by project is aggregated by program. The annual program of work and budget is then reviewed in relation to the action plan and is finally approved at the program level.

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39) Here again, mathematical programming could be used. It is probably more adaptable to resource allocation between projects than between commodities and research areas. However, as for the national level, this approach has not been researched as much as benefit-cost or scoring techniques.

## 5.7  Long-Term Resource Development Plan

The information concerning resources (human, financial, and
physical) under each program, once aggregated, serves as the input
for the next step, which is the elaboration of a strategy for the
development of the resources: financial, staff, equipment and
infrastructure.  A strong link between program and resource planning
is essential for developing effective research programs that relate
resources to program goals.  The process is again iterative, with
adjustments between the overall level of the resources given to the
institute and the objectives of the various programs.  A program may
be too ambitious, given the overall resources; its objectives may
have to be revised and its scope scaled down, unless additional
resources can be generated.

## Financial Resource Mobilization Strategy and Planning

There are two aspects to financial resource planning; the first
deals with the strategy to be pursued by the institute to obtain the
funding it needs.  The level of funding for the institute, from
national as well as foreign donors, is indicated in the national
agricultural research policy and strategy.  The short-term plan may
reveal that further funding is needed.  The institute can develop a
strategy to generate additional revenues, from the marketing of its
production, the sales of its services, or by attracting funding from
extra external sources.

The second aspect is the institute financial plan.  It includes the
aggregation of the use of funds under each program, as well as
expenditures that cannot be related to specific programs, such as
the development of land and buildings, certain human resource
development expenditures, communication and public relations
expenditures.

## Human Resource Development Plan

The input is also the institute strategic plan, with the human
resource requirements for its implementation, as specified in the
action plan.  Human resource planning involves the analysis and
determination of the types, amounts, and availability of personnel
required for the efficient and effective attainment of
organizational and program objectives.  The output of this planning
activity at the level of the institute is a long-term strategic plan
for the development of human resources.[40]

The process of developing such a plan includes three interrelated
activities which can be greatly facilitated by an effective human

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40) This section draws from the work on this subject by Bennell and Zuidema (1988).

resource information system:[41]
- analysis of human resource requirements (demand);
- assessment of the available human resources (supply);
- matching requirements to availability.

(a) Analysis of Human Resource Requirements. First, the optimal
skill and discipline composition of scientific, technical, and
support personnel for each program is determined. This is the
basis for deriving approximate human resource requirements by
category of personnel, location, discipline, and program
areas. The next step is to review the availability (supply) of
personnel and match human resource requirements to availability.

(b) Assessment of Human Resource Availability: A quantitative and
qualitative inventory of current staff is the point of
departure for assessing the availability of human resources.
Information on each staff person regarding: 1) qualifications,
including highest degree obtained, special training undertaken,
and professional work experience; 2) allocation in terms of
research program, discipline, function, and position; and 3)
location is collected and analyzed.

The analysis of human resources also includes:

i.   evaluation of the qualification of present personnel
     returning from training;

ii.  determination of the rate of attrition, due to
     retirements, deaths, resignations, and dismissals.

(c) Matching Requirements to Availability. The final stage of the
human resource planning process involves matching the estimates
of skill requirements with probable skill availabilities from
both internal and external sources. The planning process
ultimately yields detailed information on the desired number of
staff by skill level (experience) and specialization.
Comparison of the desired staff with the existing staff
determines the net addition to personnel which, when estimates
of attrition are taken into account, determines desired
recruitment levels.

The strategy to match existing with required resources is
likely to combine to varying degrees the following three
strategic options:

i.   Upgrading of existing staff and personnel, including
     short-term and degree training, as well as professional
     development. The extent of the training programs to be
     envisioned depends upon the availability of financial
     support (particularly for international activities), the

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41) ISNAR has been working on the development and implementation in various countries of
a management information system (MIS) for the three types of resources (human,
financial and physical). The financial part of a MIS is usually referred to as a
program budgeting system (PBS). See Mook (1988).

ability to launch appropriate training activities within the country, and overall staff workloads.

ii. <u>Recruitment and involvement of expatriate expertise</u>. Recruitment depends upon the availability of resources for recruiting additional staff and on the availability of appropriately trained and experienced personnel in the labor market. Expatriate expertise is a possibility when the local labor market is not able to meet the staffing requirements.

iii. <u>Staff deployment</u>. Deployment is another strategy which can be considered in meeting staffing requirements within the organization. When envisioning it, a number of issues have to be taken into account, such as maintaining a critical mass of researchers in terms of specification, program size, and geographic location.

## Physical Resource Development Strategy

The physical resource plan brings together the programs (defined by the objectives to be achieved), the physical resources required, and the financial resources available. The availability of financial resources is examined not only for initial investments, but also for the servicing, maintenance, and repairs of facilities and equipment.[42]

Physical resource planning deals with buildings, land, utilities, equipment, and other components of the institute's physical resources. It concerns itself with the establishment of new stations, and the consolidation or the phasing down of existing ones. When elaborating such a plan, the following steps should be taken:

i. evaluation of the physical resources needed for the implementation of the research program;

ii. assessment (quantity, quality, appropriateness, location, etc.) of the existing resources. The assessment can be greatly facilitated by the existence of a resource data base;

iii. elaboration of strategies for site and building development, equipment, and expendable supplies, purchasing and servicing, maintenance and repair;

## 5.8 Organizational Structure Readjustment

Managers should not only be concerned about achieving the appropriate organizational structure for planning, but also for implementation. Organizational restructuring is an important part of an institute's plan to foster the implementation of the

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42) See Hariri (1987).

institution's strategy and improve its productivity. The research
programs provide the basis for designing or adjusting the internal
structure of the institution.

In so doing, planners and managers need to identify the key managerial
functions that must be carried out. Next comes the issue of where
they are carried out (organizational levels); by whom (organizational
devices); and how (mechanisms, means). (See fig 4.)

Management functions can be divided into various tasks which will be
assigned to various bodies/individuals and at various levels of the
organization. Thus, mechanisms for coordination between the divided
tasks become important. Furthermore, management functions are
interrelated by nature: well functioning, appropriate linkages, and
channels of communication become crucial.

The issue of delegating authority and responsibility for research and
administrative tasks comes next. Also, appropriate reporting
mechanisms for monitoring and evaluation, annual programming and
mechanisms for ensuring accountability for resource utilization and
generation of results, need to be determined.

## 5.9 Monitoring and Evaluation

This component of an institute's strategic plan is often overlooked by
planners and managers. However, not only the mechanisms, but the
content of the monitoring and evaluation process, should be specified
at the time the Action Plan is elaborated. A research project should
specify not only the expected final outputs of the activities, but
also the intermediate ones. It should also specify what resources are
needed and when. This provides the basis for monitoring research
projects and programs.

Figure 4:  AN EXAMPLE OF ORGANIZATION FOR
KEY MANAGEMENT FUNCTIONS AT THE INSTITUTE LEVEL[43])

| MANAGEMENT FUNCTIONS | METHODOLOGICAL MEANS/MECHANISMS | PEOPLE/UNITS INVOLVED |
|---|---|---|
| ORGANIZING RESEARCH | • Assigning responsibilities for implementation | • Director of research |
|  | • Coordinating between implementing units | • Multi-disciplinary teams of researchers and/or<br>• Program leaders |
|  | • Approving annual programs | • Program committee<br>• Director of research |
| SUPERVISING IMPLEMENTATION | • Reporting mechanisms for monitoring and evaluation | • Director of research<br>• Program leaders |
|  | • Accounting for resource utilization | • Director of research<br>• Program leaders<br>• Station directors |
|  | • Collecting and processing information | • Financial unit<br>• Management information unit<br>• Planning unit |
| ORGANIZING RESEARCH SUPPORT | • Managing human resources | • Human resources department head |
|  | • Managing physical resources | • Administrative unit |
|  | • Accounting and budgeting | • Financial unit |

43)  This example of organization has been inspired by Sachdeva (1988a).

## 6.  PLANNING MECHANISMS AND ORGANIZATIONAL DEVICES

The focus so far has been on the sequential steps of planning, without any reference to how and by whom it is going to be done. Putting in place the appropriate mechanisms and organizational devices is the first task to be performed at the national level after a government has made the political commitment to embark upon a planning activity for the whole NARS. Similarly, at the institute level, senior management has to ensure that appropriate and well-functioning mechanisms and organizational devices for planning are in place.

This chapter presents an example of such devices and mechanisms in the context of a strategic approach to planning.  The purpose is not to advocate a specific model, but rather to provide food for thought.  Admittedly, the optimal mechanisms need to be suited to the country's specific socio-political and cultural environment.

Whatever the individual context, mechanisms for strategic planning need to provide the conditions necessary for it to be effective.  As discussed earlier, the process is a dialectical one: bottom/up and top/down. Participation of all concerned is a key ingredient: strategic planning cannot be the exclusive task of specialists appointed for that sole objective.

### 6.1  Division of Planning Activities Between System and Institute Levels

The structure of the NARS can vary from a single ministry department to a very complex configuration involving departments of ministeries, universities, autonomous institutes and commodity-financed organizations.

A research system is usually composed of one or more of the following organizations:

a)   A department under the ministry of agriculture of rural development.
b)   A department under the ministry of scientific research and/or higher education.
c)   Two or more departments, each under a different ministry, with, for example, crops research in the ministry of agriculture, livestock and veterinary research in the ministry of animal production, forestry research in the ministry of environment, etc...
d)   Parastatal semi-autonomous or autonomous organizations, with a board of trustees, and a scientific advisory committee.  As government funded, the institute still reports to a ministry. The board and the scientific advisory committee have representatives from the main interested parties.
e)   Commodity-financed and controlled research groups with consequently, total control over its activities.
f)   Departments in faculties of agriculture or universities.[44]

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44) On this topic, see in particular Trigo (1987): ISNAR/SPAAR (1987): Jain (1989) and Sachdeva (1987).

In many cases the system does not have any apex. A national
agricultural research policy and strategy can still be elaborated,
if a political commitment for it exists. However, because of the
fragmentation of the system, and in the absence of an apex, the
national plan will remain fairly general and only indicative:
detailed planning starts at the level of the institutes, which enjoy
a great deal of latitude to elaborate their own plan.

Even when an apex does exist, many planning functions are still
delegated to the institute level. The extent of the delegation
depends by-and-large on the degree of control that the national
entity can exert on the institutes, which will be determined by the
structure of the research service, and the governing organization of
the country as a whole, influenced by traditions, political factors,
and level of institutional development.

## 6.2  The National Level

A number of principles need to be followed for the elaboration of an
agricultural research policy. To stand a chance to be implemented,
the process should involve:

1.  the policymakers, because they can bring the objectives for
    agricultural development to the level of detail needed for
    their translation into research objectives; they can be made
    aware that the policies they are contributing to may affect
    research through the technology transfer system;

2.  the research practitioners, because they can determine the
    constraints for each agricultural development objective, which
    can be alleviated through research, the time span required to
    produce any results, the likelihood of research success, the
    critical resource mass needed, and the possibility of borrowing
    technology;

3.  the research users, because they can specify their needs and
    constraints, and the type of research results in which they are
    interested; some research users, in particular the farmers,
    will be represented through the extension services of the user
    ministries;

4.  the research stakeholders.

Thus, the views of the ministries, either directly concerned with
agricultural research and agricultural development, or indirectly,
insofar as agricultural development will be influenced by decisions
made in that ministry (such as economy and finance, commerce,
planning, etc.) should be taken into account. The private sector
(banks, agriculture-based industries, import-export firms,
agriculture-related services) should also have the opportunity to
make suggestions and comments.

One approach is to form an ad hoc committee made up of
representatives from some of the above organizations, with a heavier

representation of research users than research practitioners.[45]
The choice will flow from the specific circumstances of the country
(i.e., what are the most relevant organizations for agricultural
research). Specific individuals will be assigned for their
political weight. The formula for this committee, its position in
the overall organizational structure, and the extent of its mandate
will differ greatly from one type of organizational structure to the
next.

However, it is necessary that such a committee have authority to
reach decisions and give authoritative advice to the various
entities carrying out research. Thus it should be placed at a
sufficiently high level in the government structure so that its
decisions will have political weight and guarantee political
commitment. It should also be in a neutral position vis a vis the
research users and research practitioners.

The work of the national committee will be prepared by technical
task forces composed of senior scientists, managers and technical
experts. The heads of each research institute/research department
from the university/private research organization participate in the
task force. Their presence guarantees that: 1) the planning
approach is not only a top/down one; 2) research results serve as an
input for the elaboration of the policy and strategy; and 3) the
necessary link between the national and the institute level is made.

## 6.3 The Institute Level

As for the national level, one approach to guarantee the
participation of all concerned would be to set up a committee
supported by the work of technical task forces, such as a program
committee. It should be headed by either the institute director, in
the case of a semi-autonomous institute, or in the case of a
non-autonomous department, by the department head. Alternatively,
there could be a planning unit which would have the responsibility
of leading and coordinating the work of the committee. Several
research managers are involved: the research director (when such a
position exists) for program formulation; the administrative and
financial director for physical and financial resources component
planning; and the director for human resources. Representatives of
a selected sample of the organization's "stakeholders" or clients of
the institute should also participate.

A program committee can be envisaged under the director for
research. It should be multi-disciplinary and be composed of the
program leaders and representatives of key interested
organizations. Their participation is intended to foster the
relevance of the programs in terms of users' needs. This committee
prepares the long-term programs for the elaboration of the strategic
plan. For the preparation of the action plan, its role is to
aggregate by program the projects presented by the research station,
to review them and to check for consistency with the institute's
strategic plan.

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45) Planning committees have been discussed by Arnon (1975: 1985); at the institute
level, see also Dagg and Haworth (1988).

## 6.4 The Operational Level

In addition to a program committee, a technical committee can be set up at the level of the research station. The selection of activities and experiments under each project cannot be left to scientists only. When reviewing projects, the scientists are well suited to discuss the relative quality of different experiments and studies and will guarantee the scientific value of the research activities. However, assessing their relevance for the development of the agricultural sector requires identifying the technological innovations that will meet the users' needs and constraints - something research users are in a better position to appreciate than the scientists. Thus representatives of a sample of concerned groups such as farmers, extension agents, local administrators and/or entrepreneurs, should be involved in the project selection. A review committee needs also to have multidisciplinary membership reflecting the many facets of practical production problems in a commodity, including the socioeconomic limitations of farming systems.

Although the participation of farmers' organizations appears to be highly desirable, the difficulties are obvious: the number of developing countries with active and representative farmers' organizations is quite small. When organizations exist, they are likely to represent well-endowed export-crop farmers, who cannot be relied upon to speak for the more resource-poor subsistence-oriented and marginal farmers. Finally, even if farmer representation can be obtained, it is not certain that it is the most reliable way to ensure that the choice of projects and experiments under each project takes into account farmers' needs and constraints: various cultural and social barriers are likely to hinder farmer participation in committee meetings.

In such circumstances, on-farm research or client-oriented research which has been designed to help research meet the needs of specific clients, most commonly resource-poor farmers, could be a very effective planning tool.[46] Under such an approach, research activities are carried out at the farm level with the active involvement of farmers at various stages in the process. Through working with farmers under their conditions, researchers are able to gather relevant information on production systems and socioeconomic constraints. This information can then be fed back into the design of programs more responsive to farmers' needs.

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46) Merrill-Sands and McAllister (1988).

## 7. SUMMARY AND CONCLUSIONS

This paper has attempted to systematically lay out the process of agricultural research planning at three levels: the national/system, the institute, and the station/researcher level. It identified the output of the process at each of these levels: a national agricultural research policy at the system level; a long-term strategic plan at the institute level, and an Action Plan for the short to the medium term elaborated in a bottom-up fashion, starting from the researcher/station level.

The approach taken was a strategic one, emphasizing the idea of creating the future rather than merely planning for it, taking into account the needs of clients, the interests of stakeholders, the potentialities of the market and the constraints of the socioeconomic environment. The specificity of strategic planning, as well as the difficulty of its implementation was highlighted, since it fosters the involvement of all concerned in thinking creatively about the issues at stake. A strategic planning model with various steps was proposed, both at the national and the institute level.

A number of issues that planning for agricultural research faces were discussed, in particular the need to determine an appropriate and sustainable level of funding; the need to concentrate resources in priority areas, and therefore, the need to establish criteria for allocating resources and to determine a research critical mass. Research strategies were also discussed, that is the extent to which research should remain at the level of testing and adapting, essentially borrowing its technology or wherever more applied or even fundamental research is needed; and finally, various issues concerning the organizational structure for setting up programs and for planning, and monitoring and evaluation.

No specific model can be advocated for the mechanisms and organizational devices to be put in place for the purpose of planning and policy-making. These will depend upon the particular organizational structure of the agricultural research system, and upon the socioeconomic and political specificity of a country. An example of such mechanisms and organizational devices was presented as an illustration.

The overview that was presented here might seem too orderly, too neat for policymakers and research managers, tangled in the complexities of real-life situations. Many times, institutes have to elaborate their plans without any guidelines from the national level. Rarely does planning start from a clean slate which would enable following each step of the model in a logical fashion. Research managers are seldom faced with allocating anew an entire research budget; but more often with marginal allocation decisions. Using the model presented here should help deal with the complexities of the real-life situations; this, provided that it is adapted first to the particular circumstances of each situation.

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