Forestry Canada Research Program and Technology Transfer of Communications Activities¹

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Introduction

There is a growing desire in government and, in particular, within Forestry Canada to focus research programs on clients' needs and to promote communications and technology transfer so as to ensure that resulting scientific gains are available in a usable form. While the relevance of Forestry Canada research programs depends mostly on our knowledge of the forest sector's needs and a sound advisory network, the question of communications and technology transfer is more complex and requires more detailed consideration to adjust our research strategy accordingly.

Communications and Technology Transfer

Communications and technology transfer can be both complementary and independent of one another. A good communication program is certainly one of the basic tools of technology transfer; scientific and technical publications, presence in the media, and close contact with the clients are good examples of communication tools used in support of the transfer of information. However, a good communication program is not a guarantee of successful technology transfer since this outcome depends on the content of the message. In other words, if the content of the message leans towards the transfer of a given technology, a communication program can become an active means for Forestry Canada to enhance technology transfer. On the other hand, the absence of such a content means that a communication program must be directed at different objectives, such as enhancing the image of Forestry Canada, making research results available to other scientists and so on.

Research and Technology Transfer

Research and, more specifically, research and development encompass a wide spectrum of scientific activities which in turn may lend themselves to technology transfer. The simple fact of carrying out research does not mean that there will be a "product" to transfer. This is the case when an individual or an establishment is engaged in fundamental research where the discovery of principles governing some physical or biological phenomenon is the ultimate objective. At the other end of the spectrum, however, the application of known principles to a given problem may very well lead to immediate technology transfer, especially if the end product is computer software, a new type of insect trap, and so on.

Figure 1 illustrates the gradient of scientific and professional activities commonly referred to as "research" and its relationship with technology transfer and some aspects of research management and the scientific career. New knowledge is initiated at the bottom of the ladder with fundamental research. In time, the new concepts and principles derived from fundamental research can be applied to a given problem and developed into an usable tool, technique or methodology.

The last two steps are applied research and development which bring the researchers and their supporting organization closer to the clients' needs and in a better position to transfer whatever new technology has emerged. Further up the ladder, the process of learning is completed by acquisition and transfer of the technology to a few experts and consultants before it penetrates classrooms and textbooks to become part of the scientific and professional training, thus available to everyone in a given field of activity.

As we climb the ladder of research from fundamental to applied research and consultation, a research establishment is closing the gap between itself and the expectation of its client, thus easing the process of technology transfer. If technology transfer were the ultimate and only objective of Forestry Canada in research, a move towards applied research and development would be advisable. Unfortunately, the situation is not that simple and other considerations have to be taken into account before moving in one direction or another.

The cost of research generally increases as we move from fundamental to applied research and development. This is probably especially so in forestry where applied research happens in the field and implies labour-consuming manipulation, heavy equipment and costly repetitions. Given the base budget currently available to Forestry Canada for research, it is doubtful that we can move into applied research and development in high gear unless cost-shared collaboration is established with a number of partners.

Figure 1 indicates two further considerations. Both are society related. The first concerns the career path of our researchers while the second deals with the future well-being of society as a whole. Given the criteria now in use for promotion within the research category, it is clearly easier for a scientist to reach the upper echelons of the category if one confines oneself to fundamental research. Fundamental research lends itself more readily to the writing of refereed journal articles which are still one of the most important factors contributing to the career advancement of a research scientist.

On the other hand, applied research, development and expertise require constant renewal of concepts and ideas. Since fundamental research is the source of this renewal, it becomes important for a country like Canada to support a strong program of fundamental research. In forestry, where most industrial and provincial research agencies are concerned with applications and development, Forestry Canada, and to some extent the universities, must play this vital role.

Discussion and Possible Solutions

It is doubtful whether by itself a reinforced communication program can bridge the gap between Forestry Canada and its clients. A communication program would enhance the image of Forestry Canada by making known its current knowledge of the forest sector problems and our most recent accomplishments. However, a communication program will

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Figure 1. Research hierarchy and its implications.

always be limited in its content and it will prove difficult to go beyond the practical content of our research activities.

It is within Forestry Canada's management prerogative to decide to move the research program upward, bringing it closer to the needs of its clients, both in timeliness and responsiveness, thus easing the process of technology transfer. This could be achieved by setting an objective at the level of applied research, development and expertise that Forestry Canada desires to carry and changing the profile of our scientist gradually through consecutive recruitment.

This option would certainly contribute to rapid enhancement of the image of Forestry Canada. However, it also implies several disadvantages that must be considered before moving in this direction. Curtailing fundamental research carries the risk of drying up the flow of new ideas and concepts that will eventually feed the application and development activities that Canadian industry needs for a winning edge over our competitors.

A second disadvantage lies with its impact on the career opportunities of our scientists. Up to now, formal publications in refereed journals remain the surest way to achieve a higher classification. Only occasionally have we seen senior scientists achieve promotion through major accomplishments in technology transfer.

Finally, there is an added cost to applied research. Problem solving research is generally more expensive than

fundamental research, especially in silviculture since it implies higher labour costs due to the manipulation of forest stands and consequent use of heavy equipment. Moreover, focussing on problem solving might lead to many replications of the same study because, in the absence of an understanding of the basic mechanisms responsible for a given phenomenon, replication under different conditions becomes the only solution.

A third approach to technology transfer would be for Forestry Canada to create a reserve of people devoted exclusively to the transfer of applicable knowledge. This could be accomplished either by creating special teams of experts in each region whose task would be to respond quickly and positively to requests from prospective "clients" either by giving proper advice immediately or by researching the proper information through the Forestry Canada network or wherever information is available. This approach would certainly enhance the image of Forestry Canada. Some "clients" would benefit from advice and have access more rapidly to new information and technologies. On the other hand, setting aside some staff for this purpose would reduce Forestry Canada's research strength which is already spread very thin. A more serious drawback would be the limited number of "clients" who would be able to take advantage of this "new service". Given the number of users and problems specific to the nature of this operation, it is obvious that choices would have to be made, thus frustrating those clients who would be turned down. Consulting firms might also complain about unfair government competition in their field.

A more acceptable variation of the last proposal might be for Forestry Canada to sponsor publication of a *Canadian Forestry Handbook*. Although this approach shares some of the disadvantages of the previous proposal (reduction of the research strength), it also shares the advantages and would bring Forestry Canada closer to its clients (Figure 1) without discriminating among them. There is no doubt that Forestry Canada has within its ranks or has access to the expertise required for such an undertaking. The magnitude of the enterprise, however, may raise some doubts about the ability of Forestry Canada to manage the project from beginning to end.

Access to every resource of Forestry Canada (research and development) where expertise is available, and a strong involvement by headquarters in terms of leadership and coordination could offset part of this preoccupation. Furthermore, the task of producing a handbook could be facilitated by using a binder and loose-leaf format which would permit a continuous production, thus spreading the task over time and allowing for regular updating. Finally, the users' interest could be measured by requesting their assistance when determining the table of contents and by distributing the latest additions and updates through subscriptions.

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