EMERGING ALTERNATIVE ARRANGEMENTS FOR FORESTRY RESEARCH IN CANADA: Policy and Institutional Issues

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In Canada, forestry research has been carried out by the federal and provincial governments, universities, forest companies and by privately and cooperatively funded institutions. The arrangements of forestry research and technology policies and programmes remained relatively unchanged until the late 1980s. The focus of research was to increase the productivity and competitiveness of the Canadian forest sector and to maintain the environmental integrity of the science base. Advice was sought from both a National Science Council and the Forestry Research Advisory Council of Canada (FRACC).

There was a heavy reliance on the federal government to develop not only science and technology policy but also to provide the necessary resources – personnel, funding, physical infrastructure, institutional arrangements and leadership. This was the case for federal government departmental programmes as well as other levels of government and industry. Block funding grants with few constraints were given to forestry schools in universities. Federal and university scientists added to their base funds by competing for financial resources from federal research funding boards or by adjusting their research projects to meet the guidelines of five-year federal-provincial government Forest Resource Development Agreements (FRDAs).

There were very few bilateral government-industry partnerships. In the early 1970s, the Canadian Forest Service had transferred out its industrial research by creating two private, non-profit corporations in solid wood products (Forintek Canada Corp.) and in forest engineering (Forest Engineering Research Institute of Canada - FERIC). Only one government-university bilateral relationship existed in a small forest policy research group (Forest Economics and Policy Analysis Group - FEPA).

The one trilateral partnership of government-industry-university was formed in 1925/26 in pulp and paper research with the creation of the Pulp and Paper Research Institute of Canada (Paprican).

Other federal agencies and departments, such as the National Research Council, Environment Canada, Agriculture Canada, and Energy, Mines and Resources Canada also made significant contributions in their respective areas to the federal research efforts in areas related to forestry. However, there were limited advisory or collaborative arrangements between departments and efforts were *ad hoc* and on an individual agency basis.

The 1990s have become a decade of change for forestry science and technology in Canada. An enormous shift in societal attitudes and concerns has encouraged changes in forest practices towards more holistic forest management, the fuller recognition of environmental and non-consumptive forest values and the implementation of sustainable development. Many new technologies such as geographic information systems (GIS), plant biotechnology and computer-based decision-making support systems have become mainstream forest research activities. A national forestry congress in 1987 led to a National Forest Strategy, which identified nine strategic priorities (Box 1) and 96 commitments for the following five years. The Canada Forest Accord (1992), the strategy's enabling document was signed by governments, various forestry and environmental associations, universities and a forestry union.

Sustainable Forests: A Canadian Commitment
Strategic Directions

1. Forest Stewardship: The Forest Environment
To conserve the natural diversity of our forests, maintain and enhance their productive capacity, and provide for their continued renewal.

2. Forest Stewardship: Forest Management Practices
To improve our ability to plan and practise sustainable forest management

3. Public Participation: Expanding the Dialogue
To increase public participation in the allocation and management of forest lands and provide an increased level of public information and awareness

4. Economic Opportunities: A Changing Framework
To diversify and encourage economic opportunities for the forest sector in domestic and international markets

5. Forest Research: A Team Approach
To increase and focus research and technology efforts to benefit our environment and our economy

6. The Workforce: The Demands are Growing
To ensure that we have a highly skilled and adaptable workforce

7. Aboriginal People: A Unique Perspective
To increase participation by and benefits for Aboriginal people in the management and use of forests

8. Private Forest: A Growing Opportunity
To assist private forest owners to continue to improve their individual and collective abilities to manage and exercise stewardship of their land

9. Our Forests: The Global View
To reinforce Canada's responsibilities as steward of 10 % of the world's forests

In 1991, the federal government launched a major environmental programme called Canada's Green Plan. Part of the Green Plan's Partners for Sustainable Development of Forests Program was an enhanced research programme that focused on forest resource management for all forest values and an expanded data-gathering and bio-monitoring network to improve forest resource decision-making. The programme led to the first Memorandum of Understanding (MOU) between the federal government departments of Forestry, Agriculture, Fisheries and Environment. Under the MOU the partners established mechanisms to collaborate and coordinate their research programmes and projects in areas such as climate change and variability. Green Plan also supported the establishment of a network of Model Forests to test and demonstrate sustainable forestry with stakeholder involvement. Thus, not only had the subject matter become more integrated and complex, but there had also been an evolution in agency roles for funding, organisation and management of forest and forest-related Science and Technology (S&T) activities.

However, adequate funding relative to the overall needs and for appropriate time periods continued to be a constraint. A major shift was occurring with allocating resources towards the short term (usually three to five years) and towards particular issues and topics, especially of an applied nature. Longer term (core) funding was decreasing. Researchers were finding that they needed to propose short-term research projects, incorporate aspects of technology transfer and fulfil advisory services. Increasingly, they also had to become part of alliances, cooperatives, networks and other forms of collaboration in order to meet their needs and those of the forestry sector. This meant enhancing the involvement of clients in operational responsibilities related to research as well as the resultant technology transfer. Advisory committees for all aspects of research proliferated and competition for scarce resources increased.

PROGRAMME REVIEW AND TRANSITION

In the early 1990s, governments at all levels faced decreasing revenues and increasing debts due to an economy in recession. The Government of Canada decided to focus on areas of federal responsibility in order to help reduce its deficit and show fiscal restraint. Consequently, the Canadian Forest Service (Forestry Canada, at the time) was reorganised with Energy, Mines and Resources into a new department – Natural Resources Canada (NRCan). Many Advisory Boards and Councils, such as the Science Council of Canada were eliminated.

Forestry in Canada is primarily a provincial responsibility. Provinces manage most natural resources within their boundaries and this includes land management and conservation activities. NRCan withdrew direct programme spending in forestry and cancelled a series of federal-provincial forest resource development agreements which had funded applied research by federal government and university scientists as well as private consultants. NRCan now concentrates on science and technology (S&T), information gathering and dissemination, and international obligations. NRCan continues to address areas of federal responsibility such as forest resource matters on native and federal Crown lands, national regulations and the environment.

As a result of this change the federal forestry budget was reduced by 58%, federal/provincial/territorial agreements (CAN$ 435 million)[1] were cancelled; some applied research such as growth and yield studies were terminated; two national forest research institutes and six district offices were closed.

At the same time, provincial governments, in a similar fiscal situation, also cut back on research support; devolved planning and monitoring responsibilities to municipal governments and the forest industry; deregulated to external agencies; and downsized generally.

[1] CAN$ 1.00 = USD 0.70 (March 1998)

These policy and programme changes occurred at a time when public and client demands for leadership, scientific knowledge and accountability was increasing. Total Quality Management, Knowledge, Excellence and Best Practices initiatives as well as Re-engineering processes, which had been so successful in the corporate world, were taken up by governments.

It became evident that Canada had to address not only its overall national S&T policies and programmes, but also its forestry S&T agenda. New coordinating mechanisms were required by the growing number of clients and agencies to assess advice, develop co-ordinated policies and form research relationships for programmes and projects.

KEY IMPACTS IN FORESTRY RESEARCH IN CANADA

A number of initiatives have taken place to-date in order to assess current forestry R&D performance and its influencing factors as well as to develop a National Forestry S&T Agenda. Extensive consultations; workshops and fora have been organised; reviews of the literature and comparative analyses with other research systems have been conducted in the last three years. Many agencies have been involved: provincial government forestry and natural resource departments; national and provincial research councils; industrial research cooperatives; forestry and forestry-related university departments; forestry research advisory bodies; forest industry associations; non-governmental forestry and environmental interest groups and federal government departments. From the wealth of material generated through discussions, a number of key factors now impacting on forestry research in Canada emerge. They include: forest management issues; the changing nature of research; funding; relationships with client and partner agencies; organisation and management of R&D; communications; commercialisation of research and international influences (Table 1).

Table 1. Factors and Issues Impacting on Forestry Research in Canada

Forest Management

- criteria and indicators of sustainable forest management
- integration of socio-economic factors esp. aboriginal
- integration of operational and biological knowledge to develop best practices
- maintaining/enhancing competitive position by certification standards

Nature of Research

- shift from basic Long Term to applied Short Term
- increasing complexity of ecosystem based approach
- development and inclusion of "socio-economics"
- size and scale considerations in landscape management
- use of risk management principles for natural factors e.g., fire

Funding

- insufficient total level of funding
- stable maintenance of Long Term funding
- increasing number of granting agencies
- targeted project funding vs. core funding
- maintenance of critical mass of resources located appropriately

Relationships with Clients and Partner Agencies

- number and function of research advisory groups
- interrelationships/effectiveness of partners and networks
- industry participation
- emerging roles of non-traditional partners
- removal of barriers between agencies

Organisation and Management of R&D

- planning/priority setting processes and link to funding
- organisation structures for visibility, stability, external support
- supply of highly qualified personnel
- research evaluation and monitoring processes
- integration of local, national, international R & D roles
- competition for resources from non-traditional forestry agencies

Communication

- value of R&D
- broaden scope/knowledge of partners
- demand for public participation in decision making
- effectiveness of technology transfer

Commercialisation

- increasing competition/pressure for research applications
- intellectual property rights
- creation of investment incentives

Many factors and issues are similar across agencies and jurisdictions both nationally and internationally – they are not unique to Canada. NRCan's emphasis on the key factor of relationships with client and partner agencies as well as the mechanisms that it has developed to respond to those issues are central to its forestry science and technology strategy.

CANADA'S SCIENCE AND TECHNOLOGY PLAN FOR THE NEW CENTURY

Science and technology are critical to generate sustainable employment and economic growth. The Canadian federal government launched a Science and Technology Review in communities across Canada in 1994. This was the first time that individual Canadians as well as various research agencies exchanged their views and advice in a public process. Five regional conferences were held, finishing with a national forum that included more than 3000 people. Federal departments and agencies carried out parallel internal and sector reviews of their S&T policies and programmes. The independent National Advisory Board on Science and Technology (NABST) assessed the federal S&T policies. The Auditor General's report of that year also examined the overall management of federal S&T.

The result was a new umbrella blueprint of policies and principles for federal government S&T, under which all departments would function. It focused on the need to establish partnerships and networks, to decide which activities could be turned over to public-private collaboration or transferred outright to the private sector. It called for the federal government to shift its emphasis to that of a partner to business, academic institutions, other governments and voluntary organisations to stimulate increased S&T activity. It highlighted the need for better governance of S&T activities through new ways of co-operating with the private sector and other partners and the creation of new institutions to improve advice, decision making and coordination. Specifically, it called on government

departments to initiate talks with the provinces to co-ordinate S&T efforts. Statistics Canada was to create an information system to track Canada's S&T innovation and international competitiveness.

All federal government departments and agencies engaged in S&T activities are now required to incorporate this blueprint policy and its seven principles (Table 2) into their strategic plans. They are required to detail in their ongoing business and action plans how the new S&T policy will be put into effect. In addition, service departments were asked to generate enabling policies and programmes within their purview. Thus, a Human Resources Management Plan for S&T as well as a Performance Measurement Report – now an annual requirement for the Auditor General's report – were developed.

Table 2. Operating Principles for Federal Government S&T Principles

1. Increasing the effectiveness of federally supported research and training.
2. Capturing the benefits of partnership.
3. Emphasising preventive approaches and sustainable development.
4. Positioning Canada competitively within emerging international regulatory standards and intellectual property regimes.
5. Building information networks: the infrastructure of the knowledge economy.
6. Extending science and technology linkages internationally.
7. Promoting a stronger science culture.

The western provinces and territories of Canada with the federal government have also developed and signed an MOU on Science and Technology which will enhance their commitment to sharing information and technology and to cooperation in their S&T activities. The first two initiatives include the analysis and development of a Clusters Strategy as well as a summary of best practices in technology transfer from around the world.

CANADIAN RESPONSES TO FACTORS AFFECTING FORESTRY RESEARCH

NRCan was the first department to have sustainable development defined in its legislation and written into its mandate. Since the end of 1997, all federal departments were required to have at least Sustainable Development Strategies. At the departmental level, NRCan is focusing on the initiatives related to Criteria and Indicators for Sustainable Forest Management and those related to global climate change.

Within the forestry community, CFS has undertaken a number of initiatives and developed several new mechanisms to incorporate the new S&T thrust as well as to address the key factors and issues facing forestry S&T. At present, the Canadian Council of Forest Ministers (CCFM), assisted by a CFS secretariat is undertaking a national review of the current National Forest Strategy through five regional fora and workshops. This will culminate in a general forestry congress and a new Strategy in 1998. At the moment, it appears that it will include a renewed commitment to S&T; focus on the development of measurable criteria and indicators for sustainable forest development; and initiate changes in the nature and number of partnerships.

The federal/provincial/territorial CCFM has made a commitment to increase data collection and exchange, networking and partnerships for sustainable forestry. Under its auspices, a new Working Committee on S&T has been started.

A new multilateral National Advisory Board on Forest Research (NABFOR) provides CFS with strategic recommendations on forest research needs, directions, priorities and coordination, thus marking another significant change in decision-making processes. The CFS is currently revising its Strategic Plan with a new Vision, Goals and Objectives that will promote the integration of socio-economic concerns into sustainable forestry research.

Influenced by Program Review, the CFS has replaced its regional organisation which offered many forest science disciplines at each location with ten national S&T networks that each address a strategic policy issue. The networks led by five national forest research centres across Canada include:

- forest health
- climate change
- forest biodiversity
- forest ecosystem processes
- effects of forest practices
- landscape management
- fire research
- pest management methods
- tree biotechnology and advanced genetics
- socio-economic research

The networks set research priorities both within and between themselves at the regional, national and international levels. It is anticipated that this shift from a formal, hierarchical policy to programme approach towards a more informal, collaborative decision-making structure will lead to a more flexible, responsive and focused research programme. It is also anticipated that bilateral partnerships between government and university researchers or between researchers and industry that focused on aspects of forest management will decrease and multilateral research partnerships addressing sustainable forestry practices will be encouraged. The new networks are designed not only to conduct research but also to develop effective technology transfer mechanisms and potential commercialisation options.

In addition to the collaborative efforts of the Canadian Council of Forest Ministers, CFS is discussing MOUs for Sustainable Forest Research both bilateral with individual provinces and territories and also multilateral with regional groups of provinces.

CFS is also expanding the scope of its partnership activities. It has continued community level research programmes through a renewed Model Forest Program. The core funding contributed by CFS is CAN$ 5.5 million per year with some additional funds available for

Model Forest network wide strategic initiatives such as aboriginal traditional knowledge programme funding. The eleven Canadian Model Forests are made up of a partnership comprising a diversity of stakeholders such as educational institutions, aboriginal groups, industrial enterprises, local, provincial and federal agencies, community groups, environmental groups and unions (see Etheridge in this volume). Their broad objectives are to:

1. accelerate the implementation of sustainable forest management, in particular the concept of integrated resource management;
2. apply new and innovative approaches, procedures, techniques and concepts in the management of forest, and;
3. test and demonstrate the best sustainable forestry practices utilising the most advanced technology and forestry practices available.

The objectives are further refined and work plans developed for each model forest by consensus-based decision-making. This means that new scientific and operational knowledge is required. Traditional single issue investigations have been replaced by integrative forest research strategies and projects that include not only environmental, social and economic values but also new decision-making processes and research management structures.

Many people view the federal government's primary role in science and technology as one of facilitator and funding source. The CFS would like to see the establishment of a flexible forestry S&T programme and workforce that utilises both federal and external resources and expertise. To that end, it continues to support many types of partnerships in industry and universities. The following are some examples:

In support of Industry:

1. The oldest form of partnership programming has support for S&T in industry. CFS provides annual cash contributions to

industrial cooperative research agencies such as Forintek and FERIC.

2. The federal government through the National Research Council's Industrial Research Assistance Program (IRAP) helps Canadian companies identify technologies, so that they adopt innovative products and services while improving their efficiency and productivity and reducing risks. Some 250 technical advisors from universities, provincial and federal research laboratories provide the technical and business advice.
3. Industry Canada in its Technology Partnerships Canada (TPC) together with the private sector uses an "investment approach" in research, development, demonstration and market development of environmental and other technologies. TPC investments are fully repayable. The government shares with industry the upfront R&D costs needed to finalize and market competitive products. TPC will eventually reach CAN$ 250 million annually, with funds coming both from federal contributions and royalties from successful product sales.

In support of Universities:

4. Industry Canada's Canada Foundation for Innovation is a programme that provides financial support for the modernisation of physical infrastructure in post-secondary educational institutions. It operates as an independent corporation.
5. CFS/NSERC/Industry Research Partnership Program is a trilateral matching fund programme for forestry and forestry-related research. It is based on initial contributions from industry for projects conducted at Canadian universities.
6. Environment Canada Atmospheric Service Grant Program to university researchers and those in the Canadian Climate Research Network provides grants to researchers as well as

enters into contracts with universities and scientists in the Network.

7. CFS Graduate Supplements Program provides CAN$ 5,000 grants to graduate students who carry out part of their thesis work at one of the CFS centres and are partly supervised by a CFS scientist.
8. Industry Canada/National Sciences and Engineering Research Council (NSERC) Networks of Centres of Excellence (NCE) Program fund a limited number of national collaborative research networks in specific disciplines, each with a lead university but involving many other partners such as other universities, industry, federal laboratories. The current forestry-related networks are the NCE on Mechanical Wood Pulps at Paprican and the NCE in Sustainable Forest Management at the University of Alberta. The NCE-SFM has a research programme composed of four interdisciplinary themes: ecological basis of sustainability, minimal impact technologies, socio-economic sustainability and planning and practices. Proposed research must fit into at least one theme but also demonstrate integration among themes. Projects must exhibit linkages with other partners and projects and contribute to the training of graduate students. Total federal funding was CAN$ 3 million in 1997 and with additional support, the total budget was CAN$ 5.2 million.

New Partnerships currently being finalised or developed:

9. Expansion of the existing CFS/NSERC Research Partnership Program to include the Social Sciences and Health Research Council (SSHRC) for the support of socio-economic research.
10. Establishment of a CFS Scholarship Program wherein CFS would specify the disciplines or priority areas in which the scholarships would be offered.
11. Establishment of a CFS Post-doctoral Fellowship (PDF) Program at the CFS centres.

12. Establishment of an umbrella MOU with universities having forestry faculties or carrying out forest-related research. This will facilitate the exchange of personnel, sharing of facilities and resources and encourage collaborative work.
13. Development of a Matching Investment Initiative (MII) Program in which CFS would match industry R&D contributions to collaborative projects, which can be carried out in industry laboratories, collaborative research institutes, CFS research centres or various combinations of these. The project would have to match both industry's needs and the research business of the collaborating centres.
14. Development of a Matching Research Fund with environmental non-government organisations that wish to fund integrated resource management research such as forest habitat management.

It is becoming evident that the ability to form partnerships are and will be used as a measure of federal programme relevance. Partnerships are now seen as an important mechanism for facilitating strategic research, ensuring technology transfer, commercialising research and implementing new approaches and awareness of sustainable resource management.

SOME PARTNERSHIP ISSUES

Partnerships do not come without issues and challenges. Many researchers, while grateful for increased support, are apprehensive over the loss of autonomy in setting their research agenda. The greater diversity and number of decision makers mean more consultations and discussions to develop strategies, programmes and projects. Not only does the subject matter become more interdisciplinary and complex but the processes for ensuring delivery of research and technology transfer become more rigid, varied and time-consuming. Accountability for activities and funding becomes

more exact. CFS noted concerns with protecting intellectual property whether credit, publication rights or copyrights. As commercialisation of the research products or services becomes a likely goal, investment guarantees are starting to be required from partners and revenue sharing methods will need to be established. New reward systems need to be devised to foster collaboration and cooperation among partners. The various types of legal documentation used to establish partnerships, whether Accords, MOUs, Cooperative Agreements or Contracts need to be addressed.

SUMMARY

Forestry research in Canada has been dramatically influenced by the new philosophy of sustainable development, the general government deficit reduction initiatives and the creation of new national umbrella policies and programmes in science and technology. Many factors and issues have developed as the size, scale and scope of forestry research and research partnerships grew. Public sector research has evolved through public-private bilateral partnerships that focused on development of forest management systems to complex multilateral arrangements that incorporate the new concerns of sustainable forestry and increase the effectiveness of technology transfer and commercialisation activities. New institutional arrangements such as the CFS S&T networks, the Model Forests and the national NCEs plus a broad spectrum of support policies and programmes should help to meet the sustainable forestry challenge of the next century.

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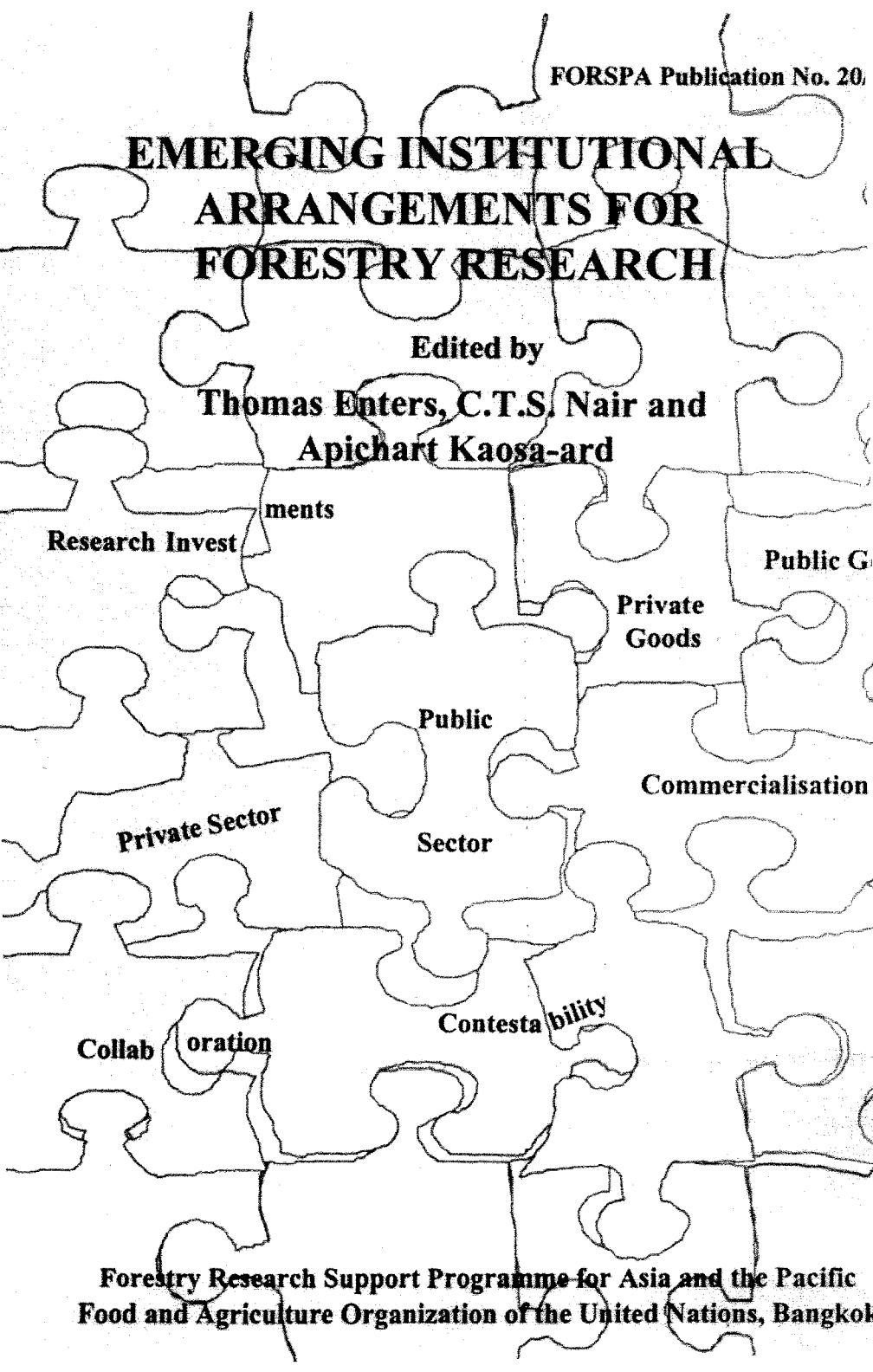

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FOREWORD

Along with the ongoing process of globalisation, forestry in the Asia-Pacific Region is undergoing fundamental changes. Many of the Region's governments have adopted liberalisation policies that have triggered a series of changes – economic, social, political and cultural. At the same time as the increasing concern about the environmental and socio-cultural roles of forests as well as the diversification of stakeholders in forestry stipulates a widening of forestry research, the current economic crisis has lead to a decrease in financial support to research and development. The forestry research community is hence reformulating research agendas and seeking alternative ways of funding and is restructuring in order to serve sustainable forest management better.

In response to the emerging demands for more efficiency and accountability and the financial pressures, various institutional arrangements have emerged, including the involvement of the non-public sector in research, although the trends that can be observed are far from homogeneous. This heterogeneity, the response of diverse stakeholders in a number of countries of the Asia-Pacific Region as well as other Regions, and the prospects for serving forestry better through collaborative research arrangements are explored in this publication. The wide range of views expressed in the contributions to this publication should serve as a very useful input to the discussions on forestry research and science policy in the Asia-Pacific Region and beyond.

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Regional Representative of FAO

The Forestry Research Support Programme for Asia and the Pacific (FORSPA) is designed to enhance country capacity in forestry research. At the regional level, it aims to develop sustainable networking arrangements through the Asia Pacific Association of Forestry Research Institutions (APAFRI). Country capacity building efforts are focused on research strategy formulation and planning, human resource development, facilitating access to information and promoting collaborative arrangements between institutions in the Region. Funded by the Government of The Netherlands, FORSPA is implemented by the Food and Agriculture Organization of the United Nations.

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