



Branch LINES

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From the Dean's Desk

"CONTROVERSY" seems to be synonymous with "forestry" in British Columbia. When the policy debates over issues like log exports or the logging plans for Clayoquot heat up, I am frequently asked "what is the Faculty of Forestry's position?" That the Faculty explicitly has no position on such matters sometimes frustrates our stakeholders from government, industry and the environmental community. Why doesn't the Faculty take positions on controversial forestry issues? If, as a matter of principle, we do not take positions on these matters, just what is the Faculty's role in helping to resolve the contentious disputes surrounding forest management and policy in British Columbia?

The University Act charters universities to serve society through education and scholarship. In policy debates, these two roles merge because we attempt to inform all sides of the disputes about the relevant information that can be gleaned from past and current scholarly work. In the Faculty of Forestry the principle form of scholarship is science, so the most useful information we can provide is scientific. In resource debates scientific information is always consequential but is rarely conclusive. This moderate role for science derives from two facts.

The first is the nature of the scientific method itself. Science can never prove a statement to be true, but rather can only prove incorrect statements to be false. The successive falsification of conjectures about how the world works (what scientists call hypotheses) narrows the area of scientific uncertainty until finally we collectively claim to "know" that a statement is "true."

This scientific process creates two dilemmas for policy makers. In most cases the predictions made by scientific information are conditional and imperfect. This forces decision makers to take a stance not only on the substance of an issue (e.g. should

an area be logged?) but also on how much to weigh risk and uncertainty (e.g. given that I do not know with certainty the outcomes for such key considerations as wildlife populations, what is the appropriate choice?). In some cases, interesting and possibly "true" hypotheses have never been confronted with the kinds of facts that would permit them to be falsified. In these instances science frustrates the decision process, because important aspects of a problem that are inherently knowable remain unknown. Foresters increasingly are asked to try new methods that operate well outside the bounds of conventional practice, so it is not too surprising that science has little to offer, especially given the comparatively low levels of investment we have made in forestry research.

The second limitation of science derives specifically from its attention to explaining the links between causes and consequences: if an area is clearcut, then a certain set of plants will have a competitive advantage over others. In contrast, many forestry decisions are explicitly about values: a particular segment of society values one particular plant association more highly than another. Science, of course, has little to say about the comparative worth of alternative assemblages of species. Prof. Kimmins of our faculty put it well in a recent paper¹:

Phrases such as "ecologically sound" forest harvesting or "ecologically destructive" forest management have no scientific basis and no information content outside of the context of society's prevailing value judgment system. Such terms imply that the science of ecology can tell us that one particular condition of a particular ecosystem is best: that it is better than all other possible conditions which that ecosystem might be in.... These questions can only be answered in the context of ... society's prevailing preferences or value systems.

At its best, science forecasts the consequences of actions. In the absence of a system of values, any of these possible states of the world has the same scientific standing. As a result, science is only a partial guide to policy or management choices.

This limitation of science is precisely its strength: it can exclude from policy or management consideration those options that are inconsistent with scientific knowledge. For example, after the recent "Timber Summit," President Clinton asked a large group of scientists to fashion land management alternatives for the federal lands of the Pacific Northwest. In each case the group of scientists predicted the outcome of the land management option, and left the President to choose among the options. The role of science in helping to craft real policy options can be enormously useful because the debate can then focus on the real choices and the real disagreements about values.

The Faculty of Forestry strives to assist in policy decisions by providing the participants with the most relevant and scientifically reliable information. Scientific knowledge frequently harbours considerable uncertainty, both as a result of the scientific method itself, and as a result of changes in management practice outstripping our investments in science. Yet the scientific facts do matter in resource decisions, and science can usefully predict some of the consequences of alternative courses of action. Evaluation of those consequences and choices among the alternatives depends on personal and societal preferences. In a democracy, the preferences of the individual scientist matter no more or less than those of other's. As a consequence, the University's charter does not empower the Faculty of Forestry to take positions on policy or management issues, although we do work hard to inform those choices. □

Clark S. Binkley

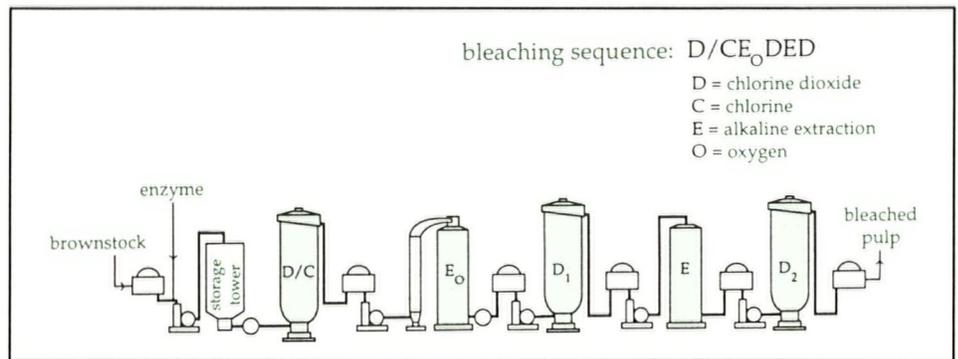
¹Kimmins, J.P. 1993. Ecology, environmentalism and green religion. *For. Chron.* 69:285-289.

The Use of Biotechnology in the Processing of Wood

BIOTECHNOLOGY has been defined as the use of living organisms, or parts thereof, for the production of goods and services. Historically humans have modified the characteristics of plants and animals through the progressive selection for desired traits and have used microorganisms to produce foods such as bread and beer. Biotechnology also holds significant promise for protecting our natural environment in many areas. Applications include the development of forest and agricultural crops to reduce the need for fertilizers and pesticides, bioremediation of contaminated sites, conversion of waste materials to energy, and the manufacture of chemicals, pulp and paper with minimal environmental impact.

Within the Chair of Forest Products Biotechnology we are looking at ways in which the tools of biotechnology can be used to help derive better and cleaner products from Canada's trees. Many of the approaches which may initially seem to relate to one forest products sector can result in applications in another. For example, an increased understanding of the colonization of lumber by sapstaining fungi can lead to more environmentally benign control strategies for lumber protection. Similar "biocontrol" microorganisms can be used to reduce staining in wood chip piles while reducing the resin and fatty acids which contribute to pitch and toxicity problems in pulp production. Similarly, work related to increasing the efficiency of conversion of sawmill residues to sugars that could be fermented to ethanol has provided much of

the groundwork for enzyme companies to be in the position to provide xylanase enzymes which are currently being evaluated in mills as part of totally chlorine free (TCF) or elemental chlorine free (ECF) bleaching strategies (see diagram).



Use of xylanase enzyme for the bleaching of kraft pulp.

While some countries, such as Switzerland, the Netherlands, Germany and the U.K., have tended to focus their biotechnology strategies in areas such as diagnostics or health care (animals/humans), countries such as Finland have specifically targeted the resource sector, and forest products/pulp and paper in particular for their national biotechnology thrust. This is one of the reasons why many of the innovations in biological bleaching, pulp effluent treatment and bioremediation were first piloted in Scandinavia. As biotechnology is implemented in areas such as food and feed processing, agriculture and forestry, many of the techniques which, for example, can be used for detecting infectious microorganisms in blood,

can also be adapted to rapidly detect particular chemicals in pulp effluents or differentiate pathogenic nematodes in wood from their more benign relatives.

The ISTC National Biotechnology Business Strategy, published in 1991, indicated that the "rapid technological change created by biotechnology presents both opportunities and economic threats to Canada. Opportunities lie in the potential to use these technologies to strengthen the economy, particularly in

the resource industries. As well, biotechnology provides an alternative to synthetic chemical technologies which can have negative impacts on the health of humans and the environment. There is, however, a clear and present threat that Canada will be left behind by other nations, which have focused their national efforts to gain competitive advantages through the use of biotechnology." We hope the biotechnology program in forest products carried out by UBC and its collaborative partners will ensure that it is Canada which gains the competitive edge.

Further information is available from Dr. Jack Saddler at (604) 222-3220 or Dr. Colette Breuil at (604) 222-3200. □

DEPARTMENT NEWS

Dean Emeritus Robert W. Kennedy was the 1993 recipient of the Distinguished Service Award of the Society of Wood Science and Technology. This award, given for the first time to a Canadian, was presented in recognition of his 35 years of contribution to educational, professional and government service. Dr. Kennedy

has also been selected as the 1993 speaker for the W.A. Coté Endowed Seminar Series in Wood Technology, to be given in October at the College of Environmental Science and Forestry at Syracuse University.

Dr. Paul Steiner has recently been elected a Fellow of International Academy of Wood Science.

In August, Dr. Julius Natterer, Chair of Timber Construction at the Swiss Federal Institute of Technology, visited the Faculty and presented a special lecture on "Latest Developments and Critical Observations of Wood Engineered Structures and Products." □

Landslides and Clearcuts

ALTHOUGH landslides are a natural phenomenon, most people share the concern for mass wasting which occurs as a consequence of forest harvesting activities on steep, sensitive terrain. The mass wasting often occurs as "debris flows," where the term is used to describe the transport of soil, rock and large fragments of wood (debris) by a fluid-like movement (flow).

A study of slope failures in clearcut areas on the Queen Charlotte Islands was initiated in 1984, by MacMillan Bloedel, to document the physical characteristics and behaviour of debris movements which occurred after logging. In total, the physical attributes of 449 events were recorded. A 1993 analysis of the data by this author and T. Rollerson, P. Geo., (MoF) has led to the development of a classification which recognizes seven types of event.

Approximately one third of the recorded events initiate and terminate on an open hillslope. Examination of the data shows the initiation of these events is well-predicted by an infinite slope stability analysis, based on a translational type of failure surface. The location of the water table within the shallow soil profile is critical to stability, and the site drainage classes used in the field survey proved to be a good, indirect measure of this parameter.

The remaining two-thirds of the events initiate on an open slope and enter a gully,



A clearcut on the Queen Charlotte Islands.

or initiate on a gully headwall or sidewall. Slightly more than fifty percent of those events in a gully reach the end of it and deposit on a fan or the valley floor. Estimates of the volume of material deposited by an event are used to establish channel debris yield rates for each type of event in the classification.

Based on this understanding of debris flow behaviour, the research is now aimed at applying the results through development of tools for decision support

in land management, based on risk assessment. The main component of the work is a probabilistic approach for interpretation of the field data and prediction of landslide characteristics. Specifically, the objective of the research is to influence professional practice in the area of terrain stability evaluations for harvest planning.

For more information, please contact Dr. Jonathan Fannin, P. Eng., at (604) 822-3133 or fax (604) 822-9106. □

DEPARTMENT NEWS

Dr. Gordon Baskerville joined the Department as Head and Professor on May 1, 1993 (see page 5 for his introductory comments).

Dr. Tony Kozak has taken an Administrative Leave until the end of 1993. During this leave he will teach two statistics courses at the University of Forestry and Wood Science in Sopron, Hungary.

In July, Dr. Peter Pearse attended the Annual Meeting of the Executive Board of the Law of the Sea Institute, in Seoul, Korea.

Also in July, Dr. G.C. van Kooten made presentations at the joint Canadian Agricultural and Farm Management Society and Western Agriculture Association Meetings in Edmonton.

Mr. Jerry Maedel, the GIS/RS coordinator with the Department, and

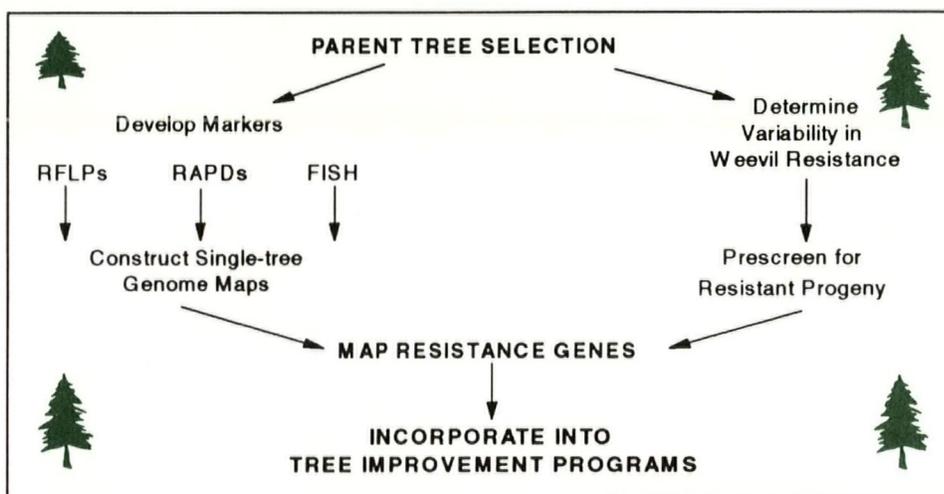
Jennifer Morrison have been involved in GIS analyses and the production of maps for the recently released "Illustrative GAP Analysis for the Northern Island Mountains Ecosession on Vancouver Island." The purpose of this project, which was funded by the Earthlife Canada Foundation, was to provide the public with condensed mapping information on resource use decision making. □

DNA Markers and Forest Tree Improvement

EFFICIENT reforestation with genetically improved material is the principal goal of tree improvement programs. This tree breeding effort will eventually lead to increased forest productivity and the sustainability of our forest resources, while helping to maintain competitiveness of our forest industry. However, progress in tree breeding is hampered by the long reproductive cycle of conifers (commonly 15-20 years). Often, the visual and quantitative techniques used for selecting economically important traits such as wood volume and density can only be accurately conducted after a tree reaches maturity.

Marker-assisted selection at the seedling stage has the potential to greatly speed the tree breeding process. We are developing DNA marker-based genetic linkage maps for major species, such as Douglas-fir and interior spruce, and are using these maps to obtain markers that can be used for early selection. DNA-marker assisted selection based on genetic maps has the potential to abbreviate the selection phase of breeding from decades to a matter of weeks. Furthermore, DNA marker-based selection can be conducted at any age, including seedlings still in the nursery, and is not sensitive to the environmental factors that can alter morphological characters.

In addition, DNA marker-based genetic maps will assist tree improvement and reforestation programs by providing markers for the evaluation and maintenance of genetic diversity, for the monitoring of controlled pollinations, and



Approach to the identification of DNA markers for spruce weevil resistance.

for the organization of germplasm (classification of genotypes, seedlots and accessions). Destruction of spruce trees by the terminal weevil (*Pissodes strobi*) causes massive losses of trees in B.C. forests. Using DNA markers we reported the first genetic linkage map for a forest tree species last year, an elite genotype of interior spruce. The genetic map that we developed for spruce is being used to identify DNA markers associated with weevil resistance. These markers will be available to the spruce tree improvement program for use in selecting weevil resistant seedlings.

Our studies make use of a new DNA marker system based on amplifying and detecting trace levels of DNA. DNA amplification markers are fully automatable, a major advantage over

other markers. This capability for automated screening of samples will make the use of DNA markers accessible to more user groups. One such user group we are collaborating with is seed production scientists. We were able to uniquely identify all of the trees in an operational interior spruce seed production orchard by DNA fingerprinting using the same DNA amplification markers used in genetic mapping studies. These fingerprints will be used to determine the effectiveness of supplemental pollination, to analyse paternity, to detect pollen contamination, to monitor parental balance in seed lots, and eventually to certify seed.

For more information, please contact Dr. John Carlson at (604) 822-4733 or fax (604) 822-6097. □

DEPARTMENT NEWS

In May, Drs. Cindy Prescott and Gordon Weetman attended the North American Forest Soils Conference in Gainesville, Florida. Dr. Prescott presented a talk on "Carbon chemistry and nutrient supply in forest floors under western red cedar – western hemlock, and western hemlock – amabilis fir on northern Vancouver Island."

Dr. Gene Namkoong recently attended the Asean-Canada Symposium on

"Genetic conservation and production of tropical forest tree seed" in Thailand.

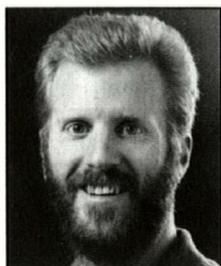
Dr. Hamish Kimmins has been appointed an associate editor of the new NSERC research journal *Environmental Reviews*.

Dr. Daniel Petersen has started a 2-year appointment as an NSERC Post-doctoral Fellow (with Dr. Chanway) working on the molecular biology of conifer rhizosphere bacteria.

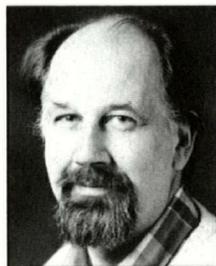
Dr. Vladimir Krajina passed away on May 31, 1993 at the age of 88. Dr. Krajina was the founder of British Columbia's Biogeoclimatic Classification System and the Ecological Reserve Program for the province. He was one of the first instructors in the Faculty's Forest Ecology course. Few people have left such a lasting positive legacy for forestry in British Columbia. □

New Appointments

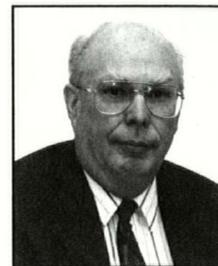
With the recent appointments of new Department Heads to Forest Resources Management and to Wood Science, all three Department Head positions are now filled. In July, a new appointment was made to the position of Director for International Forestry Programs. Introductions from these three new appointees appear below:



Dr. Andrew Howard, Director
International Forestry Programs



Dr. David Barrett, Head
Wood Science Department



Dr. Gordon Baskerville, Head
Forest Resources Management Department

The exchange of information and ideas among researchers and practitioners is fundamental to continued progress in solving problems in forestry. Nowadays, more than ever, this exchange must be international. The Faculty of Forestry has a long history of international involvement owing to the recognition by past and present members of both opportunities for learning and Canada's obligation to share knowledge and provide leadership in forestry around the world. The goal, then, of International Programs at the Faculty of Forestry is to promote more frequent and broader-based involvement of the current faculty and associates while focusing activities in the following three ways:

- concentrate on the Pacific Rim,
- collaborate with existing education and research institutions, and
- target large-scale forestry activities.

The long-term objective is to establish a Center for International Forestry at UBC within three to five years.

Increased awareness of the skills of faculty members, alumni, and other associates, and knowledge of current opportunities that meet the three criteria listed above are both critical to the achievement of our goals.

You can help by keeping in touch with Dr. Andrew Howard at (604) 822-3794; fax (604) 822-9627; e-mail: ahoward@unixg.ubc.ca. □

British Columbia is blessed with a magnificent forest resource base and an internationally competitive forest products industry. To remain competitive, the industry must increase commitments to product and process improvements and cost reduction. At the same time, the industry is challenged, over the next 30–40 years, to remain competitive while converting from the old-growth to a second growth forest resource base.

Managing the transition will require a highly skilled work force including technologists, managers, marketing specialists and scientists. The work force must be capable of generating and implementing knowledge and advanced technology to develop and manufacture high value and specialized wood products.

Our Department's challenge is to provide specialized undergraduate and graduate education in forest products and develop the knowledge needed to support an internationally competitive forest products sector in B.C. To achieve these goals the Department will be expanding national and international linkages and seeking alliances to insure that the best available students and scientists are attracted to UBC to contribute to the development of a knowledge-based forest products sector for the benefit of British Columbia and Canada.

Dr. David Barrett can be reached at (604) 822-6109; fax (604) 822-9104; e-mail: dbarrett@unixg.ubc.ca. □

As a society we are living in interesting times with respect to management of forest resources. The critical need for reasoned management of forest resources is obvious to all. Less obvious is the fact that this 'better' management has to be functionally based, and consistently applied over long time horizons, if the desired outcomes are to be achieved. We are an impatient society prone to instant solutions which, however comfortable at the moment, are for the most part functionally inadequate to the long-term task. The most important step in achieving the long term sustainability that virtually everyone wants, is arriving at workable definitions of what is to be sustained, over what time horizons, at what levels, with what quality, and with what geographic pattern. Basically, if the goal forest is identified in measurable terms, it is possible to arrive at the set of management actions which, over time, will create that forest. The challenge of educating forest managers today is to produce graduates who possess both the technical skills to design forest management given the specifications of the owners, and, the social understanding to participate in the definition of those specifications.

Dr. Gordon Baskerville can be reached at (604) 822-3362; fax (604) 822-9106; e-mail: basker@unixg.ubc.ca. □

Work Experience Projects with Overseas Students

For a number of years the Malcolm Knapp Research Forest has been hosting overseas students looking for forest-related work experience. This past year has seen a record number of such applicants to the Forest. So far this year, requests have been accommodated from two students from Fribourg, two from Munich, three from Gottingen, four from Hamburg, one from South America and one from England. Other requests from Switzerland and France are being processed.

The visiting students are usually allowed a week or more to settle in before a suitable work project is finalized. The objectives of the stay vary from student to student and forest staff take time to structure, coordinate and supervise individually tailored projects. Often the students carry out very useful work in the forest and contribute directly to planning projects and on-site work.

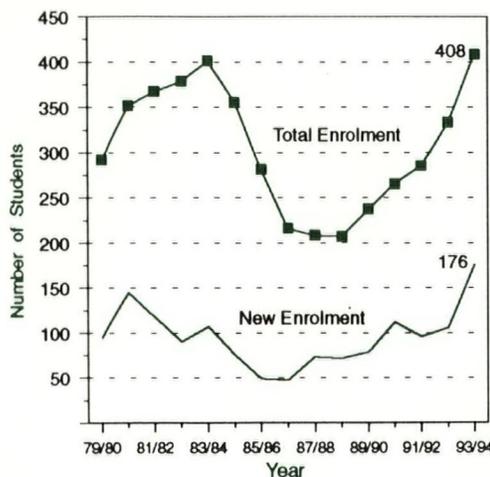
As one part of the overseas student work experience program, forest staff have been directing a series of projects redefining and surveying access into the old railway logging areas. Such areas will eventually become part of the Forest's program to increase harvesting from "immature" stands.

Overseas students often request direction to suitable projects in other parts of the province. The experiences provided to these students can afford a prime opportunity for a better understanding of British Columbia's forest management practices abroad.

If you are interested in participating in this program (students often request contacts with industry and government agencies), or would like further information, contact the Malcolm Knapp Research Forest at (604) 463-8148. □

Undergraduate Enrolment

Each fall, one of the most frequent questions that we hear is "how are enrolments this year?" Consequently, we have decided to cover this subject in each September issue of **Branch Lines**. As the chart below indicates, new student enrolment and total enrolment are the highest ever for the Faculty.



We have also succeeded in reducing or eliminating the cyclicity of our enrolment. You might recall the analysis we published (**Branch Lines** Volume 2 No. 3, September 1991) indicating our belief that new enrolment follows the business cycle in the forest sector with a two to three year lag. We have not yet experienced the decline in enrolment that would be expected from the historical pattern. This could be attributable to curriculum revisions, introduction of a new program in Natural Resources Conservation and more effective student recruitment.

Clark S. Binkley
Dean

Upcoming Careers Evening

Planning is underway for the **2nd Annual Careers Evening** for forestry undergraduate students. The event, held for the first time last fall, elicited overwhelmingly positive response from both students and alumni. Over 180 students and 30 alumni attended and socialized through a BBQ dinner and excellent presentations by professionals working in differing areas of forestry. This year's plans include efforts to involve more alumni and strengthen the communication between foresters and students. The event is planned for **Thursday October 28**. Please mark this date in your calendar and plan to attend! Invitations and further information will be mailed out shortly.

New Interview Room

The Faculty of Forestry has a new room available to employers for summer student and graduate interviews. Thanks to a generous donation from **Weldwood of Canada Limited**, an office has been converted to a functional interview room. Anyone interested in recruiting students for permanent or summer positions should contact Donna Goss for job posting and room booking details. □

NEWSLETTER PRODUCTION

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