SIMON FRASER UNIVERSITY

OFFICE OF THE VICE-PRESIDENT, ACADEMIC

MEMORANDUM

To: Senate

From: J. M. Munro, Chair
Senate Committee on Academic Planning

Subject: Faculty of Science -
Establishment of the Endowed Forest Renewal BC Chair in Terrain Analysis and Forest Geoscience
(SCAP Reference: SCAP 99 - 28)

Date: September 14, 1999

At the meeting of September 8, 1999 SCAP approved the following motion:

Motion:

"that Senate approve as set forth in S.99 - 57 , the establishment of the Endowed Forest Renewal BC Chair in Terrain Analysis and Forest Geoscience."

EARTH SCIENCES PROGRAM
SIMON FRASER UNIVERSITY

MEMORANDUM

TO: Dr. J. Munro: Vice-President Academic **FROM:** Mike Roberts
SUBJECT: FRBC Chair **DATE:** 14 September 1999

As was suggested after the last meeting of SCAP, I am forwarding to you some additional details on the hiring procedures for the Forest Renewal BC Chair in Terrain Analysis and Forest Geoscience.

The 'FRBC Implementation Committee' will determine the short list of candidates to be forwarded to the Department of Earth Sciences, for its decision in selecting the Chair. This committee was formed as part of the FRBC Endowment Program procedures and requirements. The committee members are:

Dr. M. Roberts	(EASC & GEOG)	Chair
Dr. T. Brennand	(GEOG)	
Dr. J. Clague	(EASC)	
Mr. R. Gerath	(APEGBC)	
Dr. E. Hickin	(EASC & GEOG)	
Dr. D. Marshall	(EASC)	
Dr. B. Ward	(EASC)	

(A replacement for Dr. D. Moore (GEOG))

The external member of the committee is Mr. Robert Gerath who works in the consulting engineering field for a company with an established practice in forest geoscience; he is active on APEGBC committees dealing with the practice of geoscience.

This committee will review all applications and will produce a short list. It is anticipated that the short list will be composed of three to five names. Once the Chair has been hired this committee will disband.

Advertising is already underway (the closing date is September 30, 1999) and the committee will meet in October to select the short list. If there are no qualified candidates then the search will be extended. It is absolutely essential that a qualified, energetic individual be appointed.

SCAP 99-28

SIMON FRASER UNIVERSITY
Office of the Registrar
MEMORANDUM

To: Senate Committee on Academic Planning
From: Alison Watt, Director, Secretariat Services
Subject: Forest Renewal BC
Date: 31 August, 1999

FOR INFORMATION

On April 12th, 1999, Senate approved a revision to Policy A 10.03 Endowed Academic Appointments specifying that the "terms of reference for the establishment of an endowed University Chair require Senate approval."

At the end of March, 1999, prior to the Senate action, an agreement was approved by the Board of Governors and the Province of British Columbia regarding the provision of an endowment by the Province for the Forest Renewal B.C. Chair in Terrain Analysis and Forest Geoscience.

In the spirit of the new procedures, Dr. Munro has asked that the Forest Renewal Chair proposal be circulated to SCAP and Senate for information. Dr. Mike Roberts will attend the SCAP meeting as a resource person.

Attachment

c: M. Roberts

SIMON FRASER UNIVERSITY

Earth Sciences Program

THE FOREST RENEWAL BC CHAIR

in

TERRAIN ANALYSIS AND FOREST GEOSCIENCE

FRBC ENDOWMENT PROGRAM

STAGE TWO
APPLICATION AND REVIEW PROCESS

TABLE OF CONTENTS

*** Available from Secretary of SCAP.

EXECUTIVE SUMMARY

It is intended to establish within the SFU Earth Sciences Program a provincial centre of excellence in teaching and research focused on the geoscience challenges facing the forest industry of British Columbia. These challenges include inventory issues (terrain and terrain-stability mapping) and assessment issues (terrain stability and gully assessments) all constituting important components of the province's innovative Forest Practices Code. Leadership for this endeavour will be provided by the *FRBC Chair in Terrain Analysis and Forest Geoscience*.

The FRBC Chair will be involved in the following academic initiatives:

- New Terrain Analysis Courses
- Certificate in Terrain Analysis
- Diploma in Terrain Analysis
- M.Sc. in Terrain Analysis
- Extension
- Research.

The intent of all these initiatives is to provide mechanisms by which: (1) teaching of terrain analysis will be upgraded, (2) undergraduates will be more thoroughly prepared for work in the forest geoscience sector, and (3) Practicing Professional Geoscientists (P.Geo's) and Geoscientists-in-Training (GIT's) will have a path for upgrading their terrain analysis skills. The ultimate goal of this academic program is to enhance the supply of well-trained geoscientists available to work in the forest industry.

There are four partnership groups that play a critical role in the success of this endowed Chair:

- SFU Faculty
- APEGBC (Association of Professional Engineers and Geoscientists of BC)
- Forest Consulting Industry
- Government Ministries

The Chair's interaction with these partnership groups will insure that the academic component of terrain analysis will be enhanced by feedback from forest geoscientists practicing terrain analysis. Further, the extension activities of the program will rely on these partnerships.

The University through the Faculty of Science will support the FRBC Chair by funding an additional faculty appointment and by providing administrative and infrastructure support.

1. PROGRAM PURPOSE

The goal of this initiative is to establish at Simon Fraser University's Earth Sciences Program a Provincial centre of excellence in teaching and research on the geoscience-centred challenges facing the forest industry of British Columbia. These challenges include the inventory issues (terrain and terrain-stability mapping) and the assessment issues (terrain stability and gully assessments) currently constituting important components of the Forest Practices Code. An important general goal here is to contribute to the increased effectiveness of university-industry-government networks serving the community geoscience needs in the forests of British Columbia.

In the context of training, this initiative will be accomplished by developing several new courses and new alignments of existing courses to better prepare undergraduate and graduate students in forest geoscience. In the context of research, this initiative will be accomplished largely by the promotion and development of the SFU Forest Geoscience Research Group (FGRG)[1] targeting specific forest-geoscience research problems under the primary direction of the Chair of Terrain Analysis and Forest Geoscience.

It is a goal of this initiative to make available as widely as possible in the Province the resources of the SFU Forest Geoscience Research Group and it will be the particular responsibility of the FRBC Chair to fully explore and to act on this need for effective extension programming.

Beneficiaries of this proposal include forest companies and forest-industry consulting companies through the increased supply of professional geoscientists specifically trained in critical elements of forest-geoscience. Furthermore, forest industry employees and others will have access to a new coherent university program of forest geoscience and to skill-upgrading opportunities through professional extension services (workshops and short courses). Government agencies mandated to implement legislation controlling forestry practices will benefit from access to the focused and specialized expertise available in the SFU Forest Geoscience Research Group and from the results of forest-targeted research programs.

Ultimately, all British Columbians will benefit from the reduced costs and increased tax revenues generated by the harvesting of forests in more efficiently monitored, assessed and managed forest environments.

The expected benefits generated by the teaching, research, and extension dimensions of this initiative are:

- an increased supply of much-needed highly-trained personnel in forest geoscience;
- access by forest geoscience professionals and by college and university students to forest-geoscience courses at SFU;
- access by forest geoscience professionals and by college and university students to forest-geoscience courses delivered to the entire Province by extension programming;
- access by the industry and government to an SFU-based centre of research expertise in forest geoscience;

[1] This is an informal group of faculty and graduate students within the university working on research projects of direct relevance to the forest industry. The group invites speakers from off-campus, as well as having on-campus seminars and lectures.

- research results from studies on forest-geoscience problems which will increase the efficiency and effectiveness of implementing provisions in the Forest Practices Code.
- through the direct activities of the SFU Chair of Terrain Analysis and Forest Geoscience, increased effectiveness in professional networking, coordination and communication among Provincial research agencies concerned with geoscience (terrain) problems in the forest industry;
- through the public relations activities of this high-profile FRBC Chair at SFU, increased awareness among the university community and among the public, of efforts being made on their behalf by SFU and the Provincial Government to develop better stewardship of the forests of British Columbia.

2. BACKGROUND AND PROGRAM RATIONALE

Environmental Stewardship

It is widely recognized that the ground disturbances associated with forest harvesting can lead to destabilization of the forest floor, severe erosion and related hydrologic and geomorphic problems. These problems are evident in all regions of the Province although they are most pronounced in the rugged high-relief regions of coastal British Columbia. Slope failures induced or exacerbated by poorly-sited, constructed or deactivated logging roads, the increased frequency and intensity of sediment transport in catastrophic debris flows, and degraded river systems, are some of the more obvious negative impacts which could be better managed.

The Forest Practices Code (FPC) in British Columbia is designed to reduce these impacts to a minimum by prescribing appropriate measures to be taken in all phases of logging. Unfortunately, these forest geoscience problems are usually very complex and the effective corrective measures are commonly not intuitively obvious. Their solution requires a skilled terrain assessment by professionals trained in surficial geology, geomorphology and the processes related to local slope failure and to the broad-scaled operation of river watersheds as geomorphic systems.

It is not surprising that the initial implementation of the FPC revealed that the demand for skilled terrain professionals far outstripped their supply. Although there is a core of competent geoscientists in the Ministry of Forests, administering the FPC, and in the consulting industry, there are, nevertheless, many professionals working in the forests who need and would welcome formal upgrading of their skills in surficial geology, geomorphology, terrain analysis and hazard assessment.

The Program Rationale

As a result of this severe gap between professional training and needed terrain-analysis expertise in the forests, an "expertise gap" partly created by the FPC, there is a great need for formal retraining/updating in appropriate terrain skills for practicing geoscience professionals and for modification of existing geoscience university programs to ensure that this specific competency of newly graduating geoscientists is achieved.

For the universities, the requirements of the FPC present curriculum challenges because terrain mapping and assessment procedures, although commonly addressed as secondary topics in courses on surficial geology, geomorphology and geological engineering, are not a formal focus of the teaching program at any of the Province's universities. Hence, many geoscience graduates working in the forestry industry must acquire these skills while Geoscientists-In-Training (GIT). This outcome is undesirable because it is expensive, as measured by the extra supervision and in-field training required to bring these GIT's to acceptable level of professional competence. It ought to be the expectation of forest consulting companies that newly graduated GIT's have had a basic grounding in terrain geoscience as part of their university education.

We propose, therefore, to establish an FRBC Chair in Terrain Analysis and Forest Geosciences in the Earth Sciences Program at this University to address these shortcomings. The FRBC Chair will be responsible for providing leadership in the development and teaching of terrain science and for the fostering of terrain science research. These responsibilities will involve providing direction to new

faculty as well as engaging existing SFU resources. For example, within the SFU community a number of faculty in Earth Sciences and Geography have established teaching and research interests in terrain science and closely related fields.

There is also a great need to revisit the provisions and assumptions of the Forest Practices Code. The Code represents a new, and in many ways experimental, enterprise which will need to be shepherded through many iterations as we learn lessons from its application in the years ahead. The role of the FRBC Chair will be to consult with Ministry officials and with practitioners in the forest industry in order to identify and prioritize the specific forest-geoscience problems which the Code does not currently address as well as it might. The Chair will define those research questions which this University is well-equipped to pursue in the context of graduate degree programs and faculty research. It is our intention that the Forest Geoscience Research Group at SFU will become a centre of forest-geoscience expertise and as such a major Provincial resource.

3. PARTNERSHIPS

There are four partnership groups (see Appendix A) that play a critical role in the success of this endowed Chair:

- SFU Faculty
- APEGBC
- Forestry Consulting Industry
- Government

The Chair's interaction with these partnership groups will insure that the academic component of terrain analysis will be enhanced by feedback from forest geoscientists practicing terrain analysis. Further, the extension activities of the program will rely on these partnerships.

Internal Partnerships - SFU

Although no university teaching and research program in the Province currently addresses directly this forest geoscience expertise gap, Simon Fraser University is well positioned to achieve unusual efficiencies in this regard. The Earth Sciences Program at SFU is designed to train geoscientists for professional registration in geology (APEGBC) but with a strong "soft-rock" or environmental orientation. Our students have a concentration in core areas such as sedimentology, hydrogeology and environmental geology. In addition, the Physical Geography program in science which can qualify our students for professional registration in geotechnics, has an emphasis on geomorphology and other environmental sciences. The stock of existing geoscience courses in these symbiotic programs provid[e] firm foundation for the building of a forest-geoscience professional program. This is administrative[ly] straightforward and the FRBC Chair will be responsible for developing a program model to optimize the delivery of this service in the classroom and in the field. The faculty at SFU with teaching and research interests that have direct terrain analysis applications are:

Dr. D. Allen (Earth Sciences):	Hydrogeology
Dr. T.A. Brennand (Geography):	Glacial geomorphology
Dr. J.J. Clague (Earth Sciences):	Quaternary geology
Dr. E.J. Hickin (Earth Sciences & Geography):	Fluvial geomorphology
Dr. L. Jackson (Geography Adjunct):	Quaternary geology
Dr. A.C.B. Roberts (Geography):	Remote sensing & aerial photograph interpretation
Dr. M.C. Roberts (Earth Sciences & Geography):	Geomorphology & surficial geology
Dr. M. Schmidt (Geography):	Forest soil science; geographic information systems
Dr. B. Ward (Earth Sciences):	Environmental & surficial geology

Professional Partnership - APEGBC

The Association of Professional Engineers and Geoscientists of British Columbia has the legislative authority to establish, monitor, evaluate and enforce standards of professional practice in terrain analysis in the province. This association is keenly aware of the need for its members to be involved in continuing professional development in order to be aware of, and cognizant with developments[in] geoscience. As part of the development of this Chair, formal arrangements will be made with APEG[BC] to jointly sponsor short courses and workshops in terrain analysis for members of the association.

Forestry Consulting Industry - Linkages & Partnerships

Most terrain mapping and assessment is carried out by geoscientists working for engineering or forestry consulting companies, terrain consulting companies or forest companies. With the implementation of the FPC these companies have had difficulties recruiting qualified terrain professionals because the universities are not graduating students with the optimal skills mix for these positions. It is essential that one or more representatives of consulting companies be represented on the Advisory Committee.

It should be noted that the consulting companies were represented on the committee that assembled this application: Thurber Environmental Consultants Ltd (Mr. R. Gerath), and EBA Engineering Consultants Ltd (Mr. N. Skermer).

Provincial Government Partnerships - Ministry of Forests, & Ministry of Environment, Lands and Parks

Geoscientists working with these two ministries are dealing, on a daily basis, with issues that relate to the application of terrain analysis to the lands of the province. We are establishing links with the Ministry of Forests in several ways: a) using the Mesachie Lake Field Station as a base for conducting the field components of the terrain mapping and terrain stability assessment courses; and b) involving ministry geomorphologists in this field work to insure that the students are fully aware of ministry policies and approaches to terrain work. Likewise, the program will maintain active links with geomorphologists in the Ministry of Environment, Lands and Parks because these professionals are constantly faced with applied geoscience problems relating to geomorphology and surficial geology.

4. PROGRAM DESCRIPTION

Once underway, the FRBC Chair will be involved in several academic initiatives:

- New Terrain Analysis Courses
- Certificate in Terrain Analysis
- Diploma in Terrain Analysis
- M.Sc. in Terrain Analysis
- Extension
- Research
- Faculty (Chair and Assistant Professor)

The intent of all these initiatives is to provide mechanisms by which: (1) teaching of terrain analysis will be upgraded, (2) undergraduates will be more thoroughly prepared for work in the forest geoscience sector, and (3) P.Geo's and GIT's will have a path for upgrading their terrain analysis skills. Our ultimate goal is to enhance the supply of qualified geoscientists available to work in the forest industry.

These initiatives make a critical fit with FRBC's efforts to improve the quality of all components of the labour force in the forest industry. That such an effort, such as the three initiatives listed above, is needed in the area of terrain analysis is clearly evident by recent actions of APEGBC. As a self-regulating profession, APEGBC carries out practice reviews of engineers and geoscientists to insure the competency of its members. The areas of practice scrutinized by these reviews have both a random component, whereby any registered member can be asked to undergo a review, and a targeted component in which the practice reviews specifically sample a targeted group. In the next couple of years (1998 - 1999) geoscientists engaged in terrain analysis will be such a targeted group. This targeting has come about because of dissatisfaction expressed by forest companies and the Ministry of Forests about the quality of some of the terrain work carried out by geoscientists. That this situation has arisen is not suprising given the sudden demand for terrain specialists with the advent of the Forest Practices Code. Many geoscientists and engineers would benefit greatly from professional development courses or from enrolling in the proposed Diploma program (see below) in forest geoscience.

New Terrain Analysis Courses

University courses taught by the Chair and associated faculty will complement an already strong foundation of surficial, environmental and applied geoscience in the Earth Sciences and Physical Geography Departments. Addition of the following courses will provide our geoscience majors with the tools needed to immediately make a contribution to the forestry sector.

Following is a general description of proposed new courses that will be added to those already part of the university's curriculum in terrain associated studies. The actual content of these proposed courses will change with experience gained from their teaching, and changing professional standards identified by the Chair and the Advisory Committee. The pooled experience of the present committee resulted in the identification of four courses that should be added to Earth Sciences' course offerings:

1) *Terrain Mapping and Analysis*

This course will cover the fundamentals of terrain mapping and the terrain classification system used in British Columbia. Specific topics will include: airphoto selection, polygon size, terrain survey intensity levels, amount of field checking, terrain attribute studies, review of terrain types and geomorphic processes.

2) *Terrain Stability Assessment*

This is a field-based course dealing with site specific assessment of the stability of areas to be logged or modified by road construction. Practical experience in the development of perscriptions for the mitigation of environmental impacts will be part of the course. Variations in the magnitude and frequency of slope-stability processes between the coast and interior regions of the province will addressed.

3) *Forestry Geoscience*

This is a survey course reviewing the role of the geoscientist in applying the Forest Practices Code and will include such topics as: gully assessment procedure, watershed assessment procedure, channel assessment procedure, terrain stability assessments, watershed restoration and road deactivation. A review will be made of road construction techniques and forest harvesting methods in order that the geoscientist will appreciate the constraints under which timber harvesting is carried out.

4) *Rock and Soil Mechanics*

Fundamental engineering properties of soil and bedrock. Emphasis will be placed on the understanding of soil and rock problems encountered in forest road construction and slope stability of cutblocks. The application of these concepts to regional mapping and terrain stability assessments will be reviewed.

By taking these and other geoscience courses, the details of which will be decided by the Chair and the Advisory Committee, students will receive a Certificate in Terrain Analysis (see following section).

Certificate in Terrain Analysis

It is planned to offer a Certificate in Terrain Analysis so that Earth Science and Physical Geography majors can show a specialization in terrain analysis. A certificate program at Simon Fraser University is a grouping of 18 - 30 hours of coursework within a designated area of study. The potential list of required courses in the certificate would include: Terrain Mapping and Analysis, Terrain Stability Assessment, Forestry Geoscience, Rock and Soil Mechanics, Geomorphology (3 courses) and Quaternary Geology. During the first year of the chair's appointment, the certificate would be planned in detail and moved through the university's committees for the review and implementation of new programs.

This Certificate will provide formal documentation to a potential employer that the student has taken a specialized group of courses in terrain analysis.

Diploma in Terrain Analysis

The Diploma in Terrain Analysis is a *post-baccalaureate* accreditation for geoscientists who have degrees which did not cover terrain analysis as part of their university education. It is a 30 credit hour

program designed for professional geoscientists wishing to upgrade their formal education in terra analysis. One of the tasks of the Chair during the first 18 months will be to establish the logistics of mounting a diploma program. If a demand can be shown then a diploma would be formally planned and sent through the university's approval process for new programs.

M.Sc. in Terrain Analysis

The FRBC Chair will initiate and administer the M.Sc. program in Terrain Analysis. It is anticipated that many of these of research topics will be developed in conjunction with the forest industry, the Ministry of Forests and consulting companies. The FRBC Chair will also be actively engaged in supervising graduate students in this program.

Extension

Extension, as conceived here, is the outreach function of the Chair's office whereby practicing geoscientists, engineers and technologists will have access to research findings of the university, provincial government scientists and industry consultants via workshops, short courses etc. In order that these extension efforts are not only offered in the Lower Mainland, linkages will be made with the university colleges (and UNBC) in the interior for the co-sponsoring of extension services. The resources of the staff at SFU at Harbour Centre, skilled at mounting and administering conferences and short courses, will be utilized in many of the extension offerings proposed here. Since extension will be a self-supporting enterprise (funds have not been requested from FRBC) it is essential that registration income covers the costs involved. Growth of the extension aspect of the chair during the initial five years will be a function of economy of the forest industry and the appeal of the extension offerings.
For the extension component to be successful topics for short courses, conferences and workshops will be generated by both faculty and terrain professionals working in the forest industry.

I. Short Courses & Workshops:

A recent survey of members of the Division of Engineers and Geoscientists in the Forest Industry (DEGIFS; an official group within APEGBC) identified a strong need for courses aimed at the practicing professional. Some of the courses identified are:

- Recent research findings on post-harvesting landslide occurrences
- Techniques for predicting landslide runout distance
- Field workshops for terrain stability assessments
- Terrain mapping interpretation and stability assessment
- Debris flow prediction techniques and design
- Assessing risk and predicting consequences
- Techniques to prevent/control surface soil erosion.

The Chair will provide leadership in organizing short courses and workshops for the purpose of providing venues for the release, demonstration and discussion of new research in terrain analysis. Some courses will be taught directly through University auspices, others in conjunction with selected partners. Some workshops will be field based (for example, at the Mesachie Lake Research Station), and participants will be able to obtain hands-on experience in terrain mapping or stability assessment issues.

II. Terrain Analysis Field Station:
A partnership will be formed with the Ministry of Forests to utilize the Mesachie Lake Research Station near Cowichan Lake. This station has a central location and excellent facilities for developing terrain mapping exercises and forestry projects.

III. Educational Media:
A project will be undertaken to examine the feasibility of producing a series of videos on terrain topics that could be used by forest companies, Ministry of Forests and colleges for training.

IV. Conferences:
Small, focused conferences in terrain analysis would be organized by the Chair's office to bring together practicing professionals, researchers and graduate students. These conferences would be organized in one of two formats: (a) by the university and held at some central location such as SFU Harbour Centre, or (b) in conjunction with the Annual Conference of APEGBC.

(Enrollment predictions for the new courses, workshops etc are listed on page 13.)

Research

The exact nature of the research to be carried out by the chair will reflect the qualifications of the person appointed. However, the kind of research carried out by the chair, faculty and graduate students will probably be in such areas as:

Impact of forest harvesting on alluvial fans
Effects of forest harvesting on gullies in Interior BC
Cutblock design in earthflow prone areas of glacio-marine clay outcrop
GIS -based models of landslide frequency
Strategies for channel bed restoration in logged areas
Channel assessment

In the budget submitted with this proposal $10,000 per annum is targeted as seed money for the initial funding of research topics, such as those listed above, with additional funding coming from such granting agencies as NSERC, FRBC, Science Council of BC, Ministry of Forests and the forest companies. One of the responsibilities of the chair will be to actively seek out funding sources for research.

Faculty (Chair and Assistant Professor position)

Two faculty positions will be directly associated with the activities of the chair: the chair itself and a junior faculty position funded by the university.

Chair: The person hired for this position will have a Ph.D. and expertise as a geoscientist or engineer in one or more of the areas of terrain analysis, geotechnical engineering, surfical geology, or geomorphology. An established national/international reputation with a solid research record and an ability to attract research funding will be required. A necessary attribute of the successful candidate will be an active interest in the teaching component of the terrain program combined with a willingness to provide leadership for the extension activities. The appointment will be at the rank of Professor.

Assistant Professor: As indication of the university's commitment to the Chair (and its associa activities), Dr. Brent Ward, a specialist in terrain mapping and Quaternary geology, has been appointed as an Assistant Professor in the Earth Sciences Program. He was previously employed by the Ministry of Forests as a regional geomorphologist (in Prince George) with an active role in the development of guidelines for implementing quality control for terrain activities such as mapping. Prior to the Ministry appointment he was a Quaternary geologist with the Geological Survey of Canada.
For the past year, 1997 - 98, he has been the Chair of DEGIFS (Division of Engineers and Geoscientists in the Forest Sector, APEGBC) where he has been involved in such issues as the role of professionals in the implementation of the Forest Practices Code. As part of his present role in the Earth Sciences Program he is designing the Terrain Analysis course.

STUDENT ENROLLMENT PREDICTIONS

	Year 1	Year 2	Year 3	Year 4	Year 5
Terrain Courses*	25	75	100	100	100
M.Sc. (Terrain)**	1	2	5	10	12
Certificate in Terrain Analysis***	5	10	20	20	25
Diploma in Terrain Analysis#					
Extension (Workshops, conferences, short courses)##	20	80	80	80	80

* These numbers are based on 4 courses enrolling 25 students per course. There are, at present, 30 majors in Earth Sciences and 80 in Physical Geography (B.Sc.) programs, and it is estimated that 80 of these majors will enroll in terrain courses.

** These are conservative estimates; it is based on demand from internal students only and does not factoring in off-campus students who might enroll on a part-time basis.

*** These numbers are based on about 25% of the combined Earth Sciences / Phys. Geography majors taking the Certificate. An additional 5 students might enrol in the certificate from other university programs.

No enrollment numbers are estimated because the feasibilty of the Diploma is to assessed by the Chair

Specialized conferences at SFU in Quaternary geology attract 40 to 50 attendees, so when combined with special workshops the *minimum* number is 80.

5. EXPECTED BENEFITS

The expected benefits generated by the teaching, research and extension dimensions of this initiative include:

- a Provincial centre of excellence in terrain mapping and forest geoscience
- access by forest geoscientists and by college and university students to forest-geoscience courses at SFU;
- access by forest geoscientists and by college and university students to forest-geoscience courses delivered to the entire Province by extension programming;
- access by industry and government employees to an SFU-based centre of research expertise in forest geoscience;
- through the direct activities of the FRBC Chair of Terrain Analysis and Forest Geoscience, increased effectiveness in professional networking, coordination and communication among Provincial research agencies concerned with geoscience (terrain) problems in the forest industry;
- through the public relations activities of this high-profile FRBC Chair at SFU, increased awareness among the university community and among the public, of efforts being made on their behalf by SFU and the Provincial Government to develop better stewardship of the forests of British Columbia.

The expected benefits using applicable FRBC investment priorities include:

Renewal of the forests through enhanced forestry
The efficiency and effectiveness of implementing provisions of the Forest Practices Code will be enhanced by research studies that focus on the identification and solution of terrain stability problems. Landslides and surface erosion associated with forestry can have severe impact on forest fibre production by loss of productive growing sites; however, by increasing the number of better-trained geoscientists entering the forest industry, there will be a resulting improvement in the management of landslide-prone terrain.

Restore and protect the forest environment
This program will train students in such applied areas of geoscience as watershed restoration, enhancing water quality, stream channel restoration, the planning of road de-activation - all examples of FRBC's mandate in protecting the forest environment. The mitigation of areas that were environmentally degraded under past forest practices will now be part of normal professional practice, and will be carried out as part of ongoing forest mangement.

Invest in forest worker training
The program will produce an ongoing stream of qualified personnel in forest geoscience with a specialization in terrain analysis. The extension program will provide opportunities for professionals and technicians for upgrading of their skills.

Strengthen communities that rely on the forests
Enhanced forest geoscience is but one element in the mangement of the forest that contributes to its productive capacity being maintained to insure the economic health of local communities. Adverse publicity due to environmental degradation, such as high frequency of landslides, can result in logging being prohibited in potentially productive watersheds, resulting in severe economic hardship for forestry

dependent communities. The application of state of the art terrain evaluation can reduce the environmental impact of logging and avoid conflict with lobby groups.

6. PROGRAM ADVISORY GROUP

Once the funding of the FRBC Chair is in place then a Terrain Analysis Advisory Committee will be formed. The *mandate* of this Committee is prescribed by "Terms of Reference for Forest Renewal BC Endowment Program Advisory Groups." Among the issues the committee might want to consider besides those in the terms of reference are:

- Providing advice on course development.
- Making suggestions regarding trends and developments in the professional practice of terrain mapping and hazard identification.
- Providing contact between university terrain scientists, professional groups, consulting companies, the forest industry and the appropriate government ministries.
- Meeting with all members of the SFU terrain group (Chair, other faculty and staff) on an annual basis in order to review the accomplishments and concerns of the group.
- Conduct a formal and substantive review of the program in its fourth year of operation.

The present Advisory Committee would suggest that Terrain Analysis Advisory Committee be composed of representatives of the following groups:

- Consulting companies engaged in terrain practice
- Ministry of Forests representatives
- APEGBC representatives
- Forestry industry representatives

Program Evaluation

The members of the Advisory Committee for this Stage 2 Application (see Appendix C) suggest the following preliminary list of measures and characteristics of the program that should be evaluated on a regular basis:

- Course enrollments (terrain courses)
- Number of courses offered
- Number of students taking the Certificate and Diploma Programs
- Number of extension offerings and their enrollments
- Level and sources of research funding
- List of all research projects
- List of publications
- Report on interaction with the forest consulting industry
- Report on interaction with the Ministry of Forests
- Report on interaction with APEGBC

7. PROGRAM RESOURCES

A critical institutional strength - the faculty: See Program Rationale above for a listing of faculty involved directly in terrain analysis. There is on this campus a group of faculty, although in diverse departments, willing to be active participants in the ongoing operation of this chair's functions.

Administrative and financial commitments: An indication of SFU's commitment to the establishment of this Chair is the fact that the university (through the Faculty of Science) is willing to fund:

- Assistant Professor position. The Dean (Dr. C.F.W. Jones) of the Faculty of Science recognizes that if Earth Sciences is going to provide leadership in the area of terrain mapping education, both within the institution and as an outreach program for terrain scientists in the province, then there must be additional faculty resources over and beyond this Chair. The Dean has commited to funding an Assistant Professor in the area of terrain studies and, indeed, this funding has been received.
- Administrative Assistant position. Once underway, this Chair and its associated activities (teaching, research, graduate student administration, scheduling of field workshops and short courses) will require the support of an administrative assistant. The university will fund this position.
- Equipment. The Faculty will provide funds to match those contributed by FRBC.
- Office space. Office space will be provided for the Chair and related staff.
- Library and technical support: All students will have acess to the library and computer facilites of the University.
- Financial support of the programs infrastructure.

(See Appendix D - Budget)

8. PROGRAM COMMUNICATIONS

Recognition for FRBC.

The role played by FRBC in the establishment of the Chair - and its associated activities - is clearly demonstrated to the general and professional public by the name of the Chair - Forest Renewal BC Chair in Terrain Analysis and Forest Geoscience. The Chair will be prominently identified in the university's calendar (which is distributed to thousands of students, provincial lending libraries and schools).

University Program at SFU

The central role of the FRBC Chair is organizing the teaching of the four core courses (see Program Description) and conducting research in terrain analysis. The Chair will insure that:

- Within the university community the courses in forest geoscience will be widely advertised, especially to students in the Earth Sciences and Physical Geography major programs intending to take terrain courses.
- The number of endowed chairs in the university is small and by its very existence this Chair will bring an awareness of the program to the university community at large.

Extension

The conferences, workshops and professional field trips will be advertized to reach practicing professionals, GIT's and students via such outlets as: APEGBC's 'Innovation' magazine; DEGIF's web page etc. Many of these endeavours will have proceedings or guidebooks which will be made available to the participants in the different events and to other interested parties at a later date.

APPENDIX B

IMPLEMENTATION SCHEDULE FOR THE FRBC CHAIR

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Hiring Process

The hiring timetable is as follows:

Start to Six Months: From the time that a search is authorized, and until the advertisements for the position have been placed in all the appropriate media outlets and the closing date has been reached, the elapsed time will be three months, possibly stretching to six months.
Seventh Month: Two to four weeks will needed to fine a suitable time for the advisory committee to meet and decide on a short list.
Eighth Month: The short list will probably have three to four candidates; if each candidate has two days on campus and there is one interview per week then another month will pass.
Ninth Month: Once the candidate is decided upon and an agreement has been reached on the details of the contract yet another month could elapse.
Nine to Twelve Months: Between the time the position has been offered and when the new appointment arrives at SFU will probably be about three months.

It is possible that the process might take eight months or less, but from a conservative planning viewpoint twelve months is a reasonable assumption.

FRBC Chair: First Year

During the first year the Chair will be involved in:

- Establishing a research program
- Getting a laboratory set up (purchasing: computers, aerial photography equipment etc.)
- Gaining Senate approval for the new the terrain courses
- Initiating the Certificate Program in Terrain Analysis (meet with cooperating SFU faculty and reach a consensus on course content of the certificate)
- Initial meetings of the Forest Geoscience Advisory Committee
- Advertising the Certificate Program to students
- Starting the possible development of a Diploma Program in Terrain Analysis
- Coordinating the teaching of the Terrain Mapping and Analysis course (Dr. B. Ward) with the other courses in the Certificate Program.

FRBC Chair: Second Year

- Teaching the Rock and Soil Mechanics and Terrain Stability Assessment courses
- Continue the advertising of the Certificate Program to Earth Science and Physical Geography majors
- Offer a workshop on a theme such as "Terrain stability problems on igneous bedrock: the case of the Coast Mountains". The workshop will be offered as professional development for practicing terrain professionals.
- Organize a conference on a terrain analysis theme
- If it is demonstrated there is a market, start offering the Diploma program
- Meeting of the Forest Geoscience Advisory Committee to evaluate with the Chair, and associated faculty, the progress and development of the program

FRBC Chair: Third Year

- Organize a conference on a forestry geoscience theme
- With a partner (e.g. APEGBC) organize a workshop on terrain mapping topic
- Offer a workshop on a theme such as "Terrain stability problems and forestry: the Dry Interior of BC". The workshop will be offered as professional development for practicing terrain professionals.
- Meeting of the Forest Geoscience Advisory Committee to evaluate with the Chair, and associated faculty, the progress and development of the program.

FRBC Chair: Fourth Year

- Organize a conference on a forestry geoscience theme
- Meeting of the Forest Geoscience Advisory Committee to evaluate with the Chair, and associated faculty, the progress and development of the program.

FRBC Chair: Fifth Year

- Organize a conference on a forestry geoscience theme
- Early in the fifth year the Forest Geoscience Advisory Committee will meet to conduct a *major review of the first four years of the Program's achievements.*

This **Program Review** will include such assessment criteria as:

- Undergraduate course enrollments, and enrollment trends
- Graduate course enrollments, and enrollment trends
- Number of students enrolled in the Certificate Program
- Number of conferences, workshops and field seminars organized by the Program
- Number of participants attending the conferences, workshops and field seminars
- Number and quality of collaborative research projects held by members of the SFU Forest Geoscience Research Group
- Number of publications, theses, reports etc.
- The use rate of the Terrain Analysis and Forest Geoscience website
- An *end user survey* of the effectiveness of the Program. A questionnaire will be sent to all consulting companies who had hired SFU terrain graduates for an evaluation of the program.