

ASPECT

Definition: ˈas – pekt / 1. a position facing a particular direction
2. appearance to the eye & mind.

THE DEGIFS NEWSLETTER

IN THIS ISSUE:

	Page
LETTER TO THE EDITOR.....	2
DEGIFS EXECUTIVE NOMINATIONS AND BIOS.....	3
2004 DEGIFS BURSARY RECIPIENTS	6
A NEW APPROACH TO BRITISH COLUMBIA'S FOREST ROAD POLICY.....	7
A WOOD BUDGET MODEL FOR EXAMINING WOOD DYNAMICS IN STREAMS.....	10
PUBLICATION NOTICE: LANDSLIDE RISK CASE STUDIES IN FOREST DEVELOPMENT PLANNING AND OPERATIONS.....	12
SEMINAR ANNOUNCEMENT: HARVESTING IS APPLIED ENGINEERING.....	13
WHO WE ARE.....	14
ASPECT SUBMISSION INFORMATION	14

The Editors:

Bruce Thomson, P. Geo.
brucethomson@shaw.ca

Jennifer Clarke, P. Geo.
EBA Engineering Consultants Ltd.
jclarke@eba.ca

Julie Orban, GIT.
Land and Water BC
julie.orban@gems9.gov.bc.ca

The "Editorial" – 'TIS THE SEASON TO BE VOTING!!

Get those pencils sharpened again for one more election! No, it is not some cruel joke, it is time to vote again. Just as you have recently exercised your right to vote for a representative to the Canadian government, you now have the same right in your professional life.

It is now time to review candidate profiles and vote for representatives to APEGBC Council and to the DEGIFS executive. Each of these fellow colleagues who have chosen to stand for election have indicated a desire to commit time and energy on our behalf to work towards a better, more effective and responsive professional organization. All who stand to be elected within DEGIFS will volunteer many hours of their time organizing the AGM and relevant workshops, formulating professional standards of practice, reviewing and responding to legislation as they pertain to our practice, acting as liaison between members and APEGBC and ABCFP, and many other relevant tasks. In the next few weeks I challenge all members to review candidate profiles and to vote in the upcoming APEGBC/DEGIFS elections.

The Ed

CORRECTION NOTICE

Our sincerest apologies to Kim Green for neglecting to direct readers to the NEW and IMPROVED version of her discussion paper which appeared in the May 2004 Aspect: *Utilizing Qualitative Hydro-Geomorphological Risk Analysis to Develop Best Management Practices for Forest Management in British Columbia's Southern Interior Watersheds*. This LATEST and GREATEST version can be found on the DEGIFS website at:
<http://www.degifs.com/resources.php3?category=browsecategories&item=126>

Bruce has promised to buy Kim a beer at the AGM in Whistler this October.

DIVISION OF ENGINEERS AND GEOSCIENTISTS IN THE FOREST SECTOR

Volume 9, No. 2

JULY 2004



LETTER TO THE EDITOR

Domenico Iannidinardo, FIT, EIT

My last contribution to Aspect can be found in Volume 6, No. 1 from July 2001. At that time, DEGIFS had recently awarded me a \$1000 bursary to assist in completing scholastic objectives. The application for that bursary included the requirements of an article on a relevant forest engineering topic as well as a summary of career goals. For those it may concern, standing stem helicopter harvesting is becoming common on the coast of British Columbia, and my career goals continue to be met. I have never forgotten the great assistance \$1000 was during those long, expensive school terms. I will always appreciate the effort made by DEGIFS members in establishing and disbursing such awards to all recipients including myself.

Although I have been busy working in the ensuing years since that award, I have always kept up to date on the activities of DEGIFS. My membership is always current, and I soon hope to be a more regular contributor and active participant; after all, I have been busy working as an EIT for a forest company since I left university. Why is it, though, that I feel out of place writing here as a forest engineer-in-training?

One reason may be that there are relatively few forest engineers that work for forest companies. This was pointed out in the last issue of Aspect where the concept of "side order" work experience may lead some to believe that APEGBC is allowing unqualified and/or unsupervised EIT's to accrue work experience applicable towards registration. While as a trainee I certainly do not have the experience of veteran members of this Division to challenge a direct opinion on this topic, I can remind some members of the facts of the situation with forest engineers - a topic of obvious concern to some members of our current board.

Many members practicing today needed 24 months of post-graduation experience to be eligible for professional registration. Today, EIT's require 48 months of satisfactory engineering work experience that can include experience acquired after the second year of their degree program. There are five main sections of experience that can be found on the Association's website:

1. Application of Theory,
2. Practical Experience,
3. Management of Engineering,
4. Communication Skills, and
5. Social Implications of Engineering.

These sections are expanded in the *EIT/GIT Online Experience Reporting and Review System Instructions for EIT/GIT's*. In these instructions one can read the details of the experience requirements and uncover the recent method of approving work experience online at six-month intervals. In the case of forest engineers-in-training, as with all trainees, a P.Eng. must approve each six-month summary or arrange another acceptable method with the registration department. The Association then has experts in a given field review each situation and summary independently - an acknowledgement that in some cases the egg may come before the chicken.

While I would certainly prefer to have the opportunity to work with a forest engineer during my training period, that is simply not always possible in the forest sector. The mission statement of DEGIFS acknowledges this by stating it will:

"provide a mechanism to exchange information among Division members, and between Division members and the staffs of forest companies and government agencies."

It continues to add that one of the purposes and objectives of the Division is to:

"advance all aspects of Engineering and Geoscience in the forest sector."

Nobody becomes an EIT by accident. It is a long and focused path to meet the academic requirements set by the Association. The 48 month experience period is a significant amount of time for exposure to many facets of the theory acquired in school, and to become familiar with what it means to be a professional. This includes the clear representation of facts and avoidance of conflicts of interest. The Code of Ethics is a common link between all engineers.

Being defined as a "cheap professional" by a fellow member charged to provide mechanisms for exchange between members and the advancement of all aspects of Engineering and Geoscience obfuscates situations such as mine and further diminishes the public's



confidence in our Association's ability to address important areas of concern such as mentorship. Not only must some forest engineering trainees face complications of direct supervision, their Division simply suggests that their experience should not be counted.

Why would I want to participate in DEGIFS? How should I feel having my situation of direct supervision under a Registered Professional Forester being compared to that of an electrician that did his/her apprenticeship under a plumber? The answer to both of these questions is simple. DEGIFS is a unique forum to increase the direct involvement of Association members in the forest sector. Our code of ethics requires that we extend public appreciation of engineering and geoscience – an extension to the forest sector that can truly begin when professional engineers in forest companies become more common.

The current process for EIT/GIT work experience is not perfect. Since my time of enrollment, the log-book methods have been replaced by the online reporting system. This may soon change after the close of the structured industry EIT/GIT pilot program that was recently ratified by council. This will hopefully include a more structured mentorship program and improve clarity of expectations for trainees. I commend APEGBC for its acceptance that some situations are not straightforward. The Association sees value in expanding the profession without sacrificing professional standards.

I urge DEGIFS to work with APEGBC to improve future methods of facilitating work experience. Let us focus our energy on solidifying the opportunities of professional reliance that have been afforded by recent legislative changes to formalise excellent mentorship programs, improve continuing professional development resources, and utilise discipline procedures when required. The public will pay more when they perceive that engineering is worth more. While I will always retain my DEGIFS membership with pride, I hope to see a day when the feeling of excitement I had about it three years ago returns.

DEGIFS EXECUTIVE NOMINATIONS AND BIOS

In accordance with the DEGIFS Terms of Reference (TOR), a Nominating Committee was struck to seek and propose candidates for the 2004 election of the DEGIFS Executive. The TOR specify that the executive consist of the Past Chair and 7 members elected by the DEGIFS membership. The term of an executive member is two years. Typically, half of the executive are replaced by election each year with the other half carrying on to complete their two year terms.

Executive members whom were elected last year and are continuing are:

- Brian Chow, P.Eng.
- Tim Dunne, RPF, P.Eng.
- Deepa Filatow, P.Geo.
- Heather Blyth, P.Geo.

As out going chair, Calvin VanBuskirk, P.Eng., P.Geo., will continue with the executive for an additional year as Past Chair.

Executive members completing their terms this year are:

- Eric McQuarrie, P.Eng.
- Doug Nicol, P.Eng.
- Bill Grainger, P.Geo.

The 2004 election will be for 3 members to replace the outgoing executive members.

Since there are more candidates than positions, a letter ballot will be required to fill the positions. In accordance with the DEGIFS TOR, the list of nominees is being provided in Aspect. The following is the list of the nominees, who have agreed to stand for election and their corresponding statements:

- Mark Goldbach, P.Eng., L.E.G.
- James Hogarth, P. Eng.
- Ron Jordens, P.Eng.
- Bruce Thomson, P.Geo.
- Don Williams, P.Eng.

Under the Terms of Reference, additional nominees can be made, in writing, by a minimum of two DEGIFS members. Additional nominations must be submitted, signed by the members making the nomination and accompanied by written consent of the nominees, shall be received by the DEGIFS Secretary c/o Peter Mitchell, P.Eng., at APEGBC, no later than 30 days



after publication of the list of candidates nominated by the Nominating Committee.

Affiliate members are not eligible to vote or hold office.

Critical dates for the election of Executive members include:

- Deadline for receipt in writing of nominations: 30 days after the publication of Volume 9, No. 2 of Aspect (Deadline = August 15, 2004 – assuming a July 16, 2004 release date of Volume 9, No. 2 of Aspect)
- Letter ballots to be sent to the membership eligible to vote: September 9, 2004
- Deadline for receipt of completed ballots: October 6, 2004
- Ballots to be counted: October 11, 2004
- Membership to be notified of election results at the DEGIFS Annual General Meeting scheduled for Whistler, October 21, 2004.

Additional details on the election of executive Members can be found in the DEGIFS Terms of Reference which can be found on the DEGIFS web site at: www.degifs.com.

MARK GOLDBACH, P.Eng., L.E.G.

Education: B.A.Sc. Geological Engineering, UBC
1981

Position: Associate, Golder Associates Ltd. -
Abbotsford

I am honoured to be nominated by my peers as a candidate for the DEGIFS Executive. I have been practicing geotechnical engineering in BC for 20 years with a variety of experience in the public and private sectors. Technically, my experience has been focused on terrain hazard and risk assessments and rock mechanics, primarily in the forestry and transportation sectors. This has included landslide, rockfall and debris flow assessments and mitigation, TSFA's, geotechnical input to road layout and design, investigation and design of slopes, foundations and tunnels and FPC audits. I am also a Licensed Engineering Geologist in the State of Washington,

where I conduct a variety of geotechnical assessments for the forestry industry.

Over the past year, the executive has worked diligently on several important issues related to our professional practice. This includes preparation of Guidelines for Terrain Stability Assessment in the Forest Sector and review/input to the Joint Practices Board Guidelines for Professional Services in the Forest Sector Bridge Design. If elected, I will work hard with the Executive in implementing other initiatives that are important to our members and support DEGIFS role in advocating appropriate forest legislation that clearly define the roles under which we practice and reflect the best interests of our members.

I strongly support continuing professional development (CPD) and a functional mentorship program to improve our practice and ensure we meet the technical expectations of industry and the public. With a shift towards an environment of professional reliance and risk management under the FRPA, it is imperative that our profession provide good technical advice, including a thorough evaluation of risks associated with a project, so that forest resource managers can make sound decisions. I would promote the advancement of engineering and geoscience practice in forestry through technical and professional development opportunities for the membership. This is especially important for practitioners working in remote areas of the province where relative isolation does not allow for frequent peer interaction.

DEGIFS is a very active division of APEGBC and plays a key role in advocating our profession and protecting our professional interests. I believe that greater involvement from our members is important and my decision to run for Executive reflects my willingness to be proactive and build upon the good work and strong foundation established by the present and past Executives. I believe my previous forestry experience, both in BC and other jurisdictions, provides me with a broad perspective of issues which will allow me to make a positive contribution to the activities and goals of the Executive. If elected, I will work hard to represent the interests of our members and to further promote the benefits and contributions that engineers and geoscientists provide to the forest sector.



JAMES HOGARTH, P.Eng.

Senior Geotechnical Engineer and Associate with Piteau Associates Engineering Ltd.

I consider it a great honour to be asked to run for a position in the DEGIFS Executive. Since graduating from UBC in 1991 with a degree in Geological Engineering I have practiced in the fields of soil mechanics and engineering geology. In 1996 my area of practice shifted to forestry. Since then, I have carried out projects that have ranged from pre-harvest geotechnical assessments (TSFA's, road prescriptions, etc.) to watershed restoration planning and assessments (IWRPs, landslide assessments, road deactivation assessments, etc.). In 2000 I received a post graduate diploma in Forest Engineering from UBC and IFEBC (now FMIBC).

Grey areas in regulatory documents persist and we as an organization need to push for clarification of these to help remove uncertainty over levels of enforcement and review. We need confidence in the regulatory framework under which we practice. I also believe that continuing professional development (CPD) of our members is necessary if we are going to continue to serve our clients to the best of our abilities. Other provinces have rigorous CPD programs that their members must be enrolled in and I support a similar program in B.C.

As a member of the DEGIFS Executive I would apply a philosophy of comprehensive, innovative solutions to all aspects of the role and endeavour to advance the image and the "State of the Art" of practice of engineers and geoscientists in the forest industry.

While I have not served on the DEGIFS executive before, I have recently completed a three year term as an elected director and the secretary of two international, non-profit organizations based in the United States. These two related organizations have a total of about 5500 members and maintain a significant collection of historic artifacts and documents. They also have a museum in Ypsilanti (Detroit), Michigan.

RON JORDENS, P. Eng.

Education: Bachelor Of Applied Science - Civil, UBC, 1969

Experience:

- 31 year career with the Forest Service working in all phases of forest road engineering mostly on the coast.
- 4 years as a consultant providing services in the field of forest road engineering.

DEGIFS Views: I am a member of DEGIFS because I believe that there is a place for professional engineers and geoscientists in the forest sector. My specialty and passion lies within the field of forest road engineering. I hope that my experience can contribute to the knowledge of this field to our organisation.

"Please allow me to introduce myself, I'm a
man of wealth and taste
I've been around for a long, long year, stole
many a mans soul and fate.
I was around when terrain analysis had its
moments of doubt and pain
Made damn sure that the acolytes understood
and classified their fate.
Please to meet you, hope you guess my
name,
But what's bugging you is the nature of my
game."
(With apologies to Mick and The Stones)

Fellow Members,

For those of you who have not guessed my name, it is Bruce Thomson, and I am a registered Professional Geoscientist. I have been asked to submit my name for consideration for position on Executive of DEGIFS. For those of you who are not familiar with me (and that may be many), The above "ditty" may answer some of your queries, create others, or just confuse you, but then again, "that's the nature of my game" (I am always available to assist with "answers").



DON WILLIAMS, P. Eng.

With respect to "history", I am a graduate of UBC in times long past and have been involved with earth/geoscience for over 30 years (bloody hell). I have acted as one of your editors of ASPECT, (actually wrote a few editorials), have been, and presently am (although you may not have known it) your representative on APEGBC Communications Committee and am a member of the Editorial Board of Innovation (your professional magazine, which you all should read).

I have worked for a "long, long year" with the Province of British Columbia as a quaternary geologist, regional geomorphologist, and all around good guy and raconteur. I have been employed by such august agencies as Ministry of Environment and Ministry of Forests, through many of their reincarnations. I have recently taken early retirement from Public Service (but not from life or geoscience). I do not have a specific platform to argue to you (as I do not profess to be a politician and as such do not wish to promise something that may not be deliverable). However, having said that, it is thought by some, that, if elected, I would be of "assistance" to fellow members of DEGIFS and DEGIFS Executive with regards to my "eons" of earth/geoscience experience within British Columbia (I consider myself as one of the "great trash heaps", although it may be presumptuous to use the word "great"). If there is anything that I would wish to put forward to the membership, it is, "get involved, you make the Division of Engineers and Geoscientists in the Forest Sector". As for me, I am a part of the "mature growth" that which assists with shade and nutrients for you, "the young saplings and second growth". I thank you for your time and consideration.

To those of you who have put forward your name for consideration for Executive position, kudos and luck.

BRUCE THOMSON, P.Geo.

I am honoured to be nominated for the DEGIFS Executive. I have been a practising Engineer for 9 years with experience in structural analysis, construction engineering, surveying, on-site construction engineering and project management. My experience has primarily been involved in the design of forestry bridges with spans ranging from 6m to 268m. My duties involve all phases of the forestry bridge life cycle including initial planning (crossing layout, surveying, environmental assessments), design (structure selection, conceptual design, and structural design), construction (contract management, component fabrication, construction engineering, and construction supervision) and maintenance (inspections, deactivation). I am a partner and vice-president of Allnorth Consultants Limited, a consulting engineering firm based in Prince George which provides engineering services to forest licensees in northern British Columbia and Alberta.

If elected I will strive to address the many engineering issues and concerns related to bridges in the forest sector. I will continue to build upon the DEGIFS foundation already established and will work towards further promoting professional engineers and geoscientists as professionals who can contribute in many ways to economical and sustainable forest development.

2004 DEGIFS BURSARY RECIPIENTS AND THEIR WINNING PAPERS

Once again, DEGIFS offered bursaries aimed at advancing forest engineering and geoscience / geotechnique education and practices in BC. Applicants must be enrolled in at least a third year program directly related to the practice of forest engineering and/or geoscience / geotechnique, leading to membership in APEGBC, or be enrolled, and have successfully completed Module 1 in FMIBC's Engineering Program.

The bursaries are intended to provide nominal financial assistance to students, in an accredited post-secondary or post-graduate program at a degree-granting institution in BC. Studies should relate directly to professional forest engineering and/or forest geoscience / geotechnique.



The DEGIFS Bursary Committee reviewed the applications and based on the area of study, career goals, financial need, grades and a submitted paper made recommendations for award to the DEGIFS Executive.

This year, the Executive is please to make awards of \$1,000 to each of David Campbell and David Beleznay.

David Campbell is a Master of Science graduate student in Geography at UBC, focusing on interactions between forest management and watershed geomorphology. He has been a GIT since 2001 and is working towards obtaining his P.Ge. David submitted a paper titled "A wood budget model for examining wood dynamics in Streams".

David Beleznay has recently completed his third year working towards his Bachelors of Science in Forestry, majoring in forest operations, at UBC. David plans on completing his forestry studies and obtain his RPF and also to pursue obtaining and P.Eng. designation as well. David's submitted paper was titled "A new approach to British Columbia's forest road policy."

Both papers by the successful applicants are being printed in this current edition of Aspect.

DEGIFS is pleased to be able to contribute to assist in furthering the successful applicant's education. We look forward to completion of their education, registration as an EIT/GIT and subsequent registration as a professional Engineer and/or Geoscientist with the Association of Professional Engineers and Geoscientists of British Columbia. We believe that it is important that our membership be constantly renewed and invigorated with young, enthusiastic individuals. We look forward to your future contributions to the practice of engineering and/or geoscience and DEGIFS.

We thank all applicants for their interest in DEGIFS, and we wish all the best in their future studies and careers.

Congratulations to both DEGIFS David's!!!



A NEW APPROACH TO BRITISH COLUMBIA'S FOREST ROAD POLICY

David Beleznay, B.Sc. Forestry Student, UBC

Abstract

Road management and maintenance are becoming increasingly important as the area of roadless wilderness decreases. In the journal article "Function, effects, and management of forest roads," Ariel E. Lugo and Hermann Gucinski propose a new framework for analysis on road management. Their holistic approach considers roads as an ecosystem. By defining the ecological space, and the effects that a road has in this space, roads can be managed to maximize benefits from social, economic, and environmental levels.

In B.C., forest road policy is defined under the forest practices code. In my research I found little consideration for roads as ecosystems. The approach that the Ministry of Forests takes is very specific rather than considering the system as a whole. In this paper I address B.C.'s road management in light of eco-management.

Ecosystem management of roads appears to be an ideal policy as it maximizes benefits of all that are affected by a road. But why is this approach to road management non-existent in B.C. and most of the world? This question is commonly asked in many areas of research. In this paper I also address the question: Why is Ecosystem management difficult to implement?



1. Introduction

Roads are daggers thrust into the heart of nature.

—Michael Soule, 2000

In the US a landscape is considered a wilderness, if there are no man-made disturbances within a certain distance (Nash 1973). Often the forest road is the first disturbance in a wilderness, and as the area of wilderness in North America decreases with the increasing sprawl of urbanization, road policy has become a much greater concern.

Lugo and Gucinski (2000) propose that roads be analyzed as ecosystems using an environmental gradient analysis. Their approach has many advantages, as it tackles roads from ecological and





socioeconomic viewpoints. This journal article was published in 2000 but yet in 2004 I have found no evidence of its being implemented into road policy anywhere. Why hasn't there been any sign of road managed as ecosystems?

The problem of implementing this system reaches much further than the scope of this paper, as it deals with the controversial subject of ecosystem management. The US has one of the most extensive environmental policies in the world; however, these policies merely pay lip-service to the major environmental issues (Haeuber 1998). In the last 25 years new environmental issues have arisen that have seen "greater ecological, economic, social, and even cultural, complexity" (Haeuber 1998), yet an ecosystem approach to management seems to solve little. It is supported only by a collection of agency-specific concept papers, policy guidelines documents, and potential administrative changes (Haeuber 1998). Implementing ecosystem management requires first finding a common definition, and then understanding the human constraints.

If any ecosystem management of B.C.'s forested roads exists it will be defined under the Forest Practices Code. Road layout and design, construction, maintenance and deactivation guidelines are set out by the BC Ministry of Forests (2002). To get an idea of how close B.C. is to treating roads as ecosystems I addressed these questions: Does B.C. policy in road management consider roads as ecosystems? To what extent are the external factors being considered in the construction and maintenance of forest roads? How is the process of deactivation carried out?

2. What is Ecosystem Management?

In the journals on ecosystem management the starting point for all papers is the attempt to find a definition. The one most applicable to the road ecosystem is that of Lackey (1998), who states that ecosystem management is "the careful and skillful use of ecological, economic, social, and managerial principles in managing ecosystems to produce, restore, or sustain ecosystem integrity and desired conditions, uses, products, values, and services over the long term." Other definitions are created for different disciplines but are very similar. Within these definitions new words such as *biological diversity*, *ecological integrity*, and *sustainability* arise. From the definition alone the complexity of ecosystem management can be recognized.

3. Implementation of ecosystem management

Lugo and Gucinski never really discuss the difficulty in implementing their system of road management. They believe that a lot of the focus has been on the negative effects roads have on ecosystems, while the positive effects have been ignored. They also believe that the first step to implementing road ecosystem management is defining the ecological space that a road occupies. These proposals are interesting and can be objectively argued, but do not bring us any closer to developing a legitimate policy.

Ecosystem management usually has a basic framework but lacks a bottom line for making decisions. This is often because ecosystem management has come to mean different things to different people. Lugo and Gucinski (2000) describe ecosystems as dynamic, constantly changing, and varying continuously along gradients in space and time. This infers that the boundaries from one ecosystem to the next will vary and can result in confusion. As a result, troubled responses develop as people question how we can manage an ecosystem if we can't even define it (Haeuber 1998).

A big part of the problem with trying to implement ecosystem management is the complexity and interwoven nature of the framework. This framework makes this management intangible, as "often the technical facts, ecological and sociological, are highly uncertain" (Lackey 1998). With ecosystem management the results often go unnoticed or take many years to mature.

Indeed, because ecosystem management is a way of managing for the future, results often take years to emerge. For example, a road may be designed to minimize runoff after harvesting, perhaps because seedlings downhill could die of excess water. It may be economically pleasing to simply put a road that runs straight up the hill rather than designing to minimize runoff, but in the long run this method may pay off. The problem is that governments need to display immediate results to let the public see how sound their policies are, and because ecosystem management takes time to show positive results it is often difficult to implement.

The difficulties are further exacerbated with the issue of who owns the land. In B.C., the major tenure holders would not benefit in managing a road in such a way as they will often try to return the responsibility of the stand back to the crowns as soon as possible. The major companies and other landowners are not to blame as they are a business, and like any other





business set a goal to maximize its profits. The problem is they are working with the natural resource that defines our province, and is non-renewable if it is not managed properly. Ecosystem management may benefit the forests of B.C., and is therefore up to the people of the province to provide some incentives to companies to manage for the future. Certification is a step in the right direction but is a long way from ecosystem management. Developing a workable ecosystem management process, and the decision-making tools to support it, is one of the most complex, and urgent challenges the forest ministries of the world face today (Rauscher 1999).

4. Benefits of ecosystem management

Ecosystem management offers long-term protection of the environment while allowing a growing population to adequately use the natural resources available. The strategic goal for this type of management is to find a successful middle ground between social, economic, and environmental objectives (Rauscher 1999). Lugo and Gucinski (2000) point out that if forest roads are considered as ecosystems they can be holistically evaluated from physical, biological, and socioeconomic points of view. Roads as ecosystems allow us to look at roads in the bigger picture. A road would not be simply designed for cost effectiveness if roads were considered as ecosystems. The economic side of road construction would still be considered, but other factors such as the environment, social aspects, recreation, and future plans will play a role in the design, maintenance and deactivation of the forest roads. This holistic approach allows for all people affected by forest roads to benefit in one way or another.

5. B.C. Roads

This next section describes B.C.'s current position in forest road policy and how that differs from where Lugo and Gucinski believe road policy should be. "The Forest Road Engineering Guidebook" provides guidance for interpreting and meeting the requirements of the Forest Practices Code of British Columbia.

5.1 Road Layout and Design

Road design and layout provide details for construction specifics, but according to the guidelines do not provide environmental specifics. The BC Ministry of Forests (BC MoF) (2003) describes the role of a district manager as being one that "approves road construction and modification for forest roads under

various permits." It goes on to say that there are three where the district manager does not have to approve the forested roads. One of these situations is "in-block roads," which provide for a fairly large area of forested road. Lugo and Gucinski focus their attention on roads that run through cut blocks as they are often within a constantly changing ecosystem. With no approval needed for B.C. roads, an engineer can put in a road without considering how this road will be affected in the ecosystem when the harvesting takes place.

At the end of this section on road design the guidebook sets up some requirements and factors to consider. This is where the appeal to the ecosystem is most prominent. In the requirements section the book stresses that road design should minimize impacts on other resources. For the considerations, the book looks at the importance of the use of the road, climate, and geology. These are considerations Lugo and Gucinski feel develop a strong framework for analysis when managing roads as ecosystems. The difference is that the BC MoF does not approach these considerations holistically. They look at the considerations individually and do not explain a method for including all three into one final decision.

B.C.'s guidebook wants the positive results of a road designed to minimize the costs and at the same time minimize the effects on other resources. This is the same goal as Lugo and Gucinski (2000), but the differences lie in the process. B.C. doesn't explain in any detail the process to reach the goal.



5.2 Road Deactivation

Deactivating roads is an important method of managing for the long-term. When a forested road is not in use for a certain period of time a manager may decide to deactivate the road to generate succession and restore the ecosystem. Lugo and Gucinski believe that decommissioning of roads depends on the type of road, landscape, and environment. A critical issue in deciding whether roads should be deactivated is the understanding that the longer a road is a forested landscape the more desirable its presence can be. Sometimes deactivating a road can disrupt the ecosystem more than if the road was left as it was, because it has become part of the evolving landscape (Lugo and Gucinski 2000).

The road deactivation section in the "Forest Engineering Guidebook" is more ecosystem-centered than road design, as the main goals focus on "minimizing the risks to resources" (BC MoF 2003). Deactivation of roads in B.C. focuses on landslides, soil erosion, and water quality. The three levels of





deactivation—temporary, semi-permanent, and permanent—vary depending on the future plans for the road and the time that a road is not in use. These levels are applied to meet specific site conditions, and to protect the resources at risk. The code also requires that there vegetating of all exposed soils. Like road design, road deactivation prescriptions do not always have to be approved by the district manager.

At first glance, policy for road deactivation seems much more in tune with the ecosystem than forest policy, but the small print leaves a different impression. A careful reading reveals that after permanent road deactivation, legal status is removed, thus providing a loophole for landowners to quickly waive legal responsibilities. This process ties into the lack of incentive for sure holders to manage for the ecosystem. As a result, deactivation may not be necessary or may not be at the right time, and therefore, does not ensure that the onus is on the landowners to consider the ecosystem when deactivating. Also, some prescriptions may not need to be approved and can be carried out in a way that only maximizes  economic efficiency.

6. Conclusion

In summary, Lugo and Gucinski (2000) believe that roads are a challenge to scientists and managers because they are complex ecosystems, but can be analyzed as ecosystems using an environmental gradient analysis. Along with many aspects of managing the natural resources, roads need to be considered as ecosystem. However, the problem does not lie in the idea of roads being a challenge to scientists and managers. The root of the problem goes further than understanding roads as ecosystems, and arises because of human constraints in government and law. Ecosystem management is a highly contentious topic and often doesn't reach the policy level because of the lack of immediate results.

In B.C., the policies for forested roads as defined under the Forest Practices Code are far from ecosystem management. As I now understand, there are difficulties mplementing these policies. I have worked in road design on Vancouver Island, and once, when I began to take considerable time on creeks and seepages in and around the road I was taken aside by my boss and told, "We don't get a pat on the back for that sort of thing." There is a lot of truth in that statement, as I e found we simply do not encourage managers and engineers to consider roads as part of an ecosystem.

WOOD BUDGET MODEL FOR EXAMINING WOOD DYNAMICS IN STREAMS

David Campbell, B.Sc., GIT, M.Sc. Candidate
Department of Geography, University of British Columbia

Introduction

Research over the past decade has begun to highlight the importance of large woody debris in stream systems. Woody debris plays a critical role in ecology and geomorphology and is a dominant feature of stream channels in forested regions, such as British Columbia. Wood represents the strong link between terrestrial and aquatic systems. From a geomorphic perspective, woody debris can regulate channel morphology (Abbe and Montgomery 2003, Gurnell *et al.* 2002, Montgomery *et al.* 1995), channel processes (Bilby and Ward 1991), sediment storage (Gomi *et al.* 2001; Roberts and Church 1986), pool formation (Bilby and Ward 1989) and channel recovery (Hogan 1986). Changes to the delivery, storage, and transport of woody debris within channels, therefore, lead to changes in stream morphology and aquatic habitat (McHenry *et al.* 1998). Timber harvesting operations can change woody debris supply and characteristics (McHenry *et al.* 1998; Hogan 1986). This has led watershed restoration efforts to focus on woody debris to improve fish habitat (Moore 1980; Roni *et al.* 2002), reduce stream channel disturbance (Millard 2001) and improve forest practices (Bisson *et al.* 1987; Hogan *et al.* 1998). Development in land management issues dealing with woody debris in streams ultimately requires an interdisciplinary approach. An understanding of the dynamics of wood in fluvial systems is required, and geoscientists and engineers can contribute to this land management dialogue through their knowledge of these systems.

A conceptual framework is required for understanding wood dynamics in streams. A wood budget is a tool that can be used to address these issues.

Wood budgeting framework

Wood budgeting has been useful to examine the dynamics of wood recruitment, storage, and transport in stream channels (Martin and Benda 2001, Benda *et al.* 2002, Benda and Sias 2003). A mass balance equation, or wood budget, has been used by Benda *et al.* (2002) to quantify sources, storage elements, and transfers of LWD, and is expressed as:



$$\Delta S = [I\Delta x - L\Delta x + (Q_i - Q_o)]\Delta t \quad \text{(Equation 1)}$$

where, ΔS is the change in wood storage in a reach of length Δx over time Δt , I is the rate of wood recruitment, L is the rate of overbank and abandoned loss of wood, Q_i and Q_o are the transport of wood into and out of the reach respectively, and L is the *in situ* decay of wood. The wood budget assesses the amount of wood entering and leaving a system, and the difference of these two factors results in a net loss or gain of wood stored within that system. Wood recruitment occurs from a variety of sources, and has been summarized (Benda *et al.* 2002) as:

$$I = I_m + I_f + I_{be} + I_l + I_e + I_a \quad \text{(Equation 2)}$$

where the input or recruitment of wood to the channel (I) includes sources from mortality of trees, from blow-down, disease, or suppression (I_m); disturbance such as fire or windstorm (I_f); recruitment from eroded and collapsed channel banks (I_{be}); landslide delivery (I_l); entrainment and exhumation of wood from log jams (I_e); and anthropogenic input of wood (I_a).

Wood depletion, or the removal of wood from a channel, has been observed to occur at an exponential rate (Murphy and Koski 1989, Beechie *et al.* 2000, Hyatt and Naiman 2001). Murphy and Koski (1989) suggest that the exponential decay model is a realistic description of woody debris loss, and suggest decay of the form:

$$V_t = V_0 e^{-Kt} \quad \text{(Equation 3)}$$

where V_t is the amount of LWD at time t , V_0 is the amount of LWD at initial conditions ($t=0$), and K is the decay constant, which is represented as the inverse of the weighted mean age of LWD:

$$K = 1/\Delta T \quad \text{(Equation 4)}$$

The exponential decay function represents the depletion (decay and removal) of wood from the channel, not strictly the biogenic decay of LWD (Hyatt and Naiman 2001), but can also represent loss due to transport, abrasion. The depletion of LWD, R , over a time period T , is then:

$$R = \int_0^T V_0(t)(1 - e^{-Kt})\Delta t \quad \text{(Equation 5)}$$

A length of stream channel can be viewed as a reservoir for LWD, with wood entering, leaving and being stored in that reservoir. The component reaches of a channel length l , can be integrated into a single reservoir, and the wood budget is then represented as:

$$\Delta S = \int^L [I\Delta x - L\Delta x + (Q_i - Q_o) - R]\Delta t \quad \text{(Equation 6)}$$

If the channel extends far enough into its headwaters, the component of wood transport from upstream (Q_i) can be considered negligible. Loss of wood overbank (L) is assumed to be zero, and the loss of wood from the reservoir (R) is assumed to reflect the output of wood from the system (Q_o) and the decay of LWD (D). The wood budget then reduces to:

$$\Delta S = (I - R)\Delta t \quad \text{(Equation 7)}$$

Applications of Wood Budgeting in the Forest Sector

Wood budgets provide a conceptual framework to examine wood dynamics in streams. The key components of the wood budget are the input and the depletion, or removal, of wood to the fluvial system. Logging operations will affect the supply, or input, of wood on both on the short-term (Millard 2001), and long-term (Benda *et al.* 2002). Changes to channel stability or stream flow may also affect wood and sediment transport, and therefore the depletion of wood from the system.

Understanding the dynamics of wood in streams is important because of its importance for channel stability, morphology, and aquatic habitat. Many geomorphic factors will affect both the supply and transport of wood in these systems. Components of the wood budget will vary with channel size, watershed position and characteristics, flow regimes, connectivity with hillslope processes, biogeography, channel morphology, and land-use. Particularly because of the interaction of forestry and these components, understanding these dynamics is a critical aspect of forest management. The interactions between woody debris and channel processes are complex, and assessment of these factors requires professional understanding of geomorphic systems. A wood budget is a tool available that provides a context to assess wood dynamics in streams.



PUBLICATION NOTICE:

LANDSLIDE RISK CASE STUDIES IN FOREST DEVELOPMENT PLANNING AND OPERATIONS Land Management Handbook 56

LAND MANAGEMENT HANDBOOK

56

Landslide Risk Case Studies in Forest
Development Planning and Operations



2004



Ministry of Forests Forest Science Program

New Publication:

Landslide Risk Case Studies in Forest Development Planning and Operations

The Ministry of Forests has recently published Land Management Handbook 56, *Landslide Risk Case Studies in Forest Development Planning and Operations*, edited by Mike Wise, Glenn Moore, and Doug VanDine.

This handbook presents a framework for landslide risk management, describes technical terms and methods of landslide risk analysis, and presents 8 case studies prepared by experienced and knowledgeable terrain stability professionals.

It has been prepared for both terrain stability professionals and forest resource managers.

The objectives of the case studies are:

- to demonstrate approaches for the analysis of landslide risk in forest development, based on a common framework, terms and concepts;
- to illustrate different types of analyses for estimating landslide probability and consequence for cases with differing site conditions and elements; and
- to highlight the application of current terrain stability research in professional practice in the BC Forest Sector.

This new handbook (120 pages) is available in electronic format and can be downloaded from the following Ministry of Forests website:

<http://www.for.gov.bc.ca/hfd/pubs/Lmh.htm>

Hard copies of the handbook can be purchased from:

Crown Publications
 521 Fort Street
 Victoria, BC V8W 1E7
 Phone: (250) 386-4636
 Email: crown@pinc.com
 Internet: <http://www.crownpub.bc.ca>



**SEMINAR ANNOUNCEMENT:
HARVESTING IS APPLIED ENGINEERING
COFE**

TO: Interested parties of the WESTERN REGIONAL COUNCIL ON FOREST ENGINEERING (WR.COFE)

FROM: Ed Aulerich, Chairman, WR.COFE

The Executive Committee and membership of the COUNCIL ON FOREST ENGINEERING at its meeting in Hot Springs, Arkansas, April 29, 2004, agreed to accept my proposal for reactivating the WR.COFE. I wish to thank all of the people who supported this effort.

As the group becomes established, we will be electing officers for the organization and anyone who is interested in becoming involved is welcome. Initially, I will try to get the ball rolling.

For the initial efforts of WR.COFE I am scheduling a series of one-day seminars at locations in Oregon, Washington, California, and British Columbia for this fall and winter. I have planned the first meeting as follows:

Topic: HARVESTING IS APPLIED ENGINEERING

Location: The Corvallis Depot, Corvallis, Oregon

Date: November 12, 2004

Cost: COFE Members - \$75 USD
Non-members - \$100 USD
Speakers - No Charge

Other tentative locations and dates are proposed as follows. If you have other suggestions, please let me know.

December 17, 2004 -- Eureka, California
February 18, 2005 -- Olympia, Washington
April 8, 2005 -- Duncan, British Columbia
April 22, 2005 -- Redding, California

ATTENTION: Tentative Speakers

Persons who are interested in presenting a paper or giving a talk at any of these meetings are welcome. The talk should be about the topic of applying engineering to the harvesting or roading efforts we are confronted with in the industry today. This means anything about techniques of using equipment, planning, equipment selection, mapping, etc. You do not need to write a paper to present something. We are not interested at this point to get a publication. What we are interested in is sharing information of interest that is useful to the industry. You can use slides, overheads, videos, PowerPoint, or a combination to present your information. The length of the talk should be about 30 minutes.

If you are interested in being a speaker, send me a brief abstract of your talk before August 1, 2004.

Council on Forest Engineering
620 SW 4th Street
Corvallis, OR 97333
Tel: 541-754-7558 Fax: 541-754-7559
Email: office@cofe.org
Website: www.cofe.org
www.cofe.org



Who We Are

EDITORIAL BOARD

Iain Blown

Ph: (250) 837-3743 / Fx: (250) 837-3783

Email: blown@rctvonline.net

Shelley Higman

Ph: (250) 775-3550 / Fx: (250) 755-3421

Email: shelley.higman@weyerhaeuser.com

Eric McQuarrie

Ph: (250) 721-1665 / Fx: (250) 721-1665

Email: emcquarrie@shaw.ca

Bob Patrick

Ph: (250) 756-2256 / Fx: (250) 756-2686

Email: bpatrik@eba.ca

Do Not Forget!!!

ASPECT SUBMISSIONS

LAST DATE FOR SUBMISSIONS TO ASPECT	NEWSLETTER RELEASE DATE
SEPT. 3, 2004	SEPT. 24, 2004
NOV. 19, 2004	DEC. 10, 2004

Electronic submissions in **Word format (only)** should be made to Julie Orban by the date listed above (no exceptions) (julie.orban@gems9.gov.bc.ca).

Refer to *Guidelines for Submission* on the website <http://www.degifs.com/guidelines.doc> for submission requirements.

DEGIFS EXECUTIVE

Calvin VanBuskirk, P.Eng., P.Geo., Chair

Ph. (250) 832-3933 / Fx. (250) 832-1117

Email: calvinvb@sunwave.net

Brian Chow, P.Eng., Vice Chair, Bursary Co-ordinator

Ph. (250) 387-8615 / Fx. (250) 387-6445

Email: brian.chow@gems2.gov.bc.ca

Tim Dunne, RPF, P.Eng., Secretary

Ph. (250) 832-3366 / Fx. (250) 832-3811

Email: tdunne@forsite-sa.com

Deepa Filatow, P.Geo., Co-Treasurer

Ph. (250) 764-5266

Email: deepa@telus.net

Bill Grainger, P.Geo., Co-Treasurer, Affiliate Liaison

Ph. (250) 833-0901 / Fx. (250) 833-0901

Email: bgrainger@telus.net

Doug Nicol, P.Eng., Guideline Subcommittee Chair

Ph. (250) 825-1100 / Fx. (250) 825-9657

Email: doug.nicol@gems3.gov.bc.ca

Heather Blyth, P.Geo., Workshops / AGM Coordinator

Ph. (250) 339-0690 / Fx. (250) 339-0690

Email: hblyth@shaw.ca

Eric McQuarrie, P.Eng., Past Chair

Ph. (250) 721-1665 / Fx. (250) 721-1665

Email: emcquarrie@shaw.ca

APEGBC LIAISON

Peter Mitchell, P.Eng., APEGBC Liaison, Alternate JPB Liaison

Ph. (604) 430-8035 / Fx. (604) 430-8085

Email: mitchell@apeg.bc.ca

WEB PAGE CONTACT

Heather Blyth, P.Geo.

Ph. (250) 339-0690 / Fx. (250) 339-0690

Email: hblyth@shaw.ca