



Remsoft Educational Partner Program
Annual Report 2010



Overview

Educational Institutions around the world are using Remsoft software to enhance sustainable management practices. Each institution has provided a brief abstract as to how they have implemented this technology into their program.

For more information about the Remsoft Educational Partner Program, please contact partners@remsoft.com.

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College of North Atlantic

Integrated Resource Management

Students in this course of the Forest Resources Technician program are provided with an orientation and demonstrations of the Remsoft Spatial Planning system and its application to sustainable forest management planning in a Newfoundland context. The students learn the process of constructing a wood supply model for use in Remsoft products including constructing landscapes, yields, actions and transitions for a small woodlot area. Students then contrast this experience of this approach to the GIS-based approach used in their respective integrated resource management plan developed as part of the course requirements. The use of the Remsoft tools in this manner is intended to link the students' newly gained knowledge around management planning with current practices used in industry and government processes.

Lanamme University of Costa Rica

The Woodstock program has been used for two graduation projects (thesis) to obtain the degree of Civil Engineering. The two projects are:

1. Applying a linear optimization methodology for a long term planning of Costa Rican road network
2. Methodology for an investment plan based on pavement visual data condition at a municipal level

In the second semester of 2011, we will start a research project that involves pavement friction data. We will use Woodstock to create a methodology for an investment plan for asphalt overlays Road Safety involving pavement friction. We want to write a paper and present it in 2012 at the 3rd Latin American Conference of Road Safety which includes Latin America, Spain and Portugal, plus all the agencies involved, such as United Nations (UN), World Health Organization (WHO), International Development Bank (IDB), World Bank, etc.

Lincoln University

FORS 310 Forest Management

The software was used in teaching forest management.

Maritime College of Forest Technology

Forest Management II

MCFT students were provided with lab exercises in which they explored forest management alternatives decisions applied on a hypothetical forest.

1. These management choices included:
 - a. Total volume harvested
 - b. Harvest rules (e.g. prioritizing harvesting oldest stands vs. stands with highest volumes vs. stands projected to lose volume)
 - c. Levels of silviculture (planting / spacing)

Under different management regimes, students determined sustainable harvest levels (where volume cut never exceeds volume available) over a 100 year time horizon. Through these exercises students could quantify and then be challenged to explain how and why alternative choices influenced results. Beyond determining the sustainable annual allowable cut (AAC) under different regimes, students observed how age class structure of the forest and representation of vegetative communities changed through time.

Learning outcomes included:

1. An introductory understanding and “demystification” of models employed by forest managers. An understanding of examples of key choices forest managers can make and apply at a forest level over a long time period (e.g. harvest level, harvest rules, silviculture levels).
2. The degree to which harvesting rule choices can influence sustainable harvest, and why those choices have such an impact.
3. To gain an understanding of the limitations and characteristics of the Allowable Cut Effect (ACE: an immediate increase in AAC made possible by silviculture activities that increase future yields and / or shorten time to operability in young stands) .
4. To learn to examine how management regimes can influence both timber and non-timber (e.g. habitat supply) values that could flow from that forested area into the future.

Mississippi State University

Advanced Forest Management and Planning

Donald Grebner and Ian Munn are in the process of developing an online version of Mississippi State University’s traditional lecture based course on Advance Forest Management and Planning. The intent of this graduate level course is to teach students about financial analysis, growth and yield models, stand management, as well as mathematical programming techniques such as dynamic programming, goal programming, and mixed integer programming. They intend to use Remsoft Spatial Planning system as the platform for teaching the forest level planning aspect of the course. Data sets used will include those in textbook Forest Management and Planning by Bettinger, P., Boston, K., Siry, J., and Grebner, D.

North Carolina State University

FOR 734 - Advanced Forest Management Planning

This course covers the history, principles, structures and use of modern forest management planning and decision-making techniques. Emphasis on optimization procedures covering both investment analysis, land management and public forest management. In lab we learn the basic use of the Remsoft product: Woodstock.

FOR 505 - Forest Management

This course covers the fundamental principles and analytical techniques necessary in the planning, management and optimization of forest operations. Formulation of objectives and constraints, yield forecasting, forest regulation, procurement and marketing, inventory methods, and management plan preparation. Written and oral reporting are required.

Assessing Optimal Management Responses to uncertainty and risk in timber production, through the integration of process based models for silvicultural, climate, and economics: Case studies comparing the Southeast U.S. and South America

Comparative timber productivities and investment returns determine where global forest investments occur. This research is to assess how to deal with an uncertain future when climate, silvicultural intensity, and financial variability are taken into account. Process Based Models of forests, incorporated into Woodstock, are the tool for integrating stochastic variables into the decision making process. This is an integration of detailed stochastic biophysical and financial analyses to build improved models of forest growth and timber investment returns, and improve understanding of how salient biological production processes and financial returns and risks affect productivity and profits in the Southeast U.S. and South America.

Oregon State University

FOR 457 Techniques for Forest Resource Analysis

Use of linear programming, nonlinear programming, dynamic programming, and simulation to solve complex forest management problems, with emphasis on intertemporal multiple use scheduling. Forestry transportation problems, multiple-use allocation, and investment analysis.

FE 447 Tactical and Operational Planning Techniques

Use of linear, mixed integer, heuristic methods, and simulation to solve forest operations management problems with emphasis on harvest scheduling, transportation planning, crew, and truck scheduling.

FOR 459 Forest Resource Planning and Decision Making

Integration of biological, economic and amenity characteristics of the forest system in resource management planning and decision making. Senior capstone class projects.

Sir Wilfred Grenfell College

Quantitative assessment of forest management under climate change scenarios

A range of management strategies are formulated to assess sustainability of forest dynamics (species composition, growing stock, age-class structure), timber supply, stream water quality, and carbon budget under climate change scenarios in the Humber River Basin. Formulations of management alternatives, prediction of forest development, and calculation of indicators proceeded over a 160-year planning horizon, the duration required by the provincial wood supply analysis for Newfoundland and Labrador, and compiled in a Linear Programming (LP) model using Remsoft Woodstock (Remsoft 2010). Decision variables of the LP model are defined as area that will receive different silvicultural prescriptions according to various stand types and site classes in five-year increments. The product of decision variables and strata-based yield curves gives estimate of harvestable volume and growing stock in five-year increments. The model constrains calculations by taking into account currently-implemented sustainable management strategies of even wood volume, eligibility rules, transition rules, retention of older forests, and limits on harvest levels.

Stephen F. Austin State University

FOR 411 Timber Management

We use Remsoft in our Timber Management course to teach students about state-of-the-art harvest scheduling software.

University of Alberta

FOR 431 Integrated Forest Management

This is the capstone course in the BSc(Forestry) program at the University of Alberta. We spend 5 weeks of the lap portion of the course introducing the students to RSPS. The students develop and compare alternative forest management scenarios for a forest. Based on the comparison, the students develop a scenario into a detailed forest management plan.

REN R 430 (Forest Resources Management)

Mathematical programming, decision analysis and computer simulation applied to natural resource management problems.

A simulation/optimization system for modeling timber and old forest under stochastic fire disturbance. MSc thesis.

Stochastic wildfire disturbance contributes to uncertainty in forest management planning. In the study, a system composed of an optimizing forest estate model nested within a Monte Carlo simulation model of stand replacing fires is used to investigate the impact stochastic fire may have on the achievement of harvest level and old forest area targets. Two different variations of the modeling system are used to test the impact a buffer stock of timber will have on the probability of achieving these indicator targets. Preliminary results suggest that a reduced harvest level may increase the probability of indicator achievement. However, the immediate harvest level decrease necessary is high and there is still no assurance of the target achievement. Further, from a net present value perspective, most scenarios examined showed a higher profit in the absence of a buffer stock. Lastly, a case study application was presented using actual forest inventory and yield table data. The optimization model used in this system was generated by Woodstock.

University of Canterbury

FORE 316 – Forest Management

Woodstock was used in this course to illustrate concepts of forest estate modeling.

University of Idaho

Simulating harvest scheduling and wood supply effects on conifer seed germination rates

As part of his dissertation with Anthony S. Davis at the University of Idaho, Rob Keefe is using Remsoft software to study how forest management emphasizing local wood use can affect the interaction between overstory removal and the seed germination microclimate. Mr. Keefe uses a process-based soil moisture model and a new, hybrid seed germination model to forecast how different harvesting objectives can affect germination rates. This work integrates hybrid forest simulation modeling with the unparalleled strength of Remsoft Spatial Planning System.

FORP432 Low volume forest roads

This is a core, senior level undergraduate forest products course at the University of Idaho. The primary course content is design, layout, and engineering of low volume forest road networks. Mr. Keefe, who is teaching the course during the spring semester, 2011, uses the Remsoft SPS to demonstrate some relatively simple optimization problems in the context of road planning, and to provide a brief overview of managing road assets.

Université Laval

Analyse de scénarios d'aménagement (cours de premier cycle, optionnel)

Analyse de scénarios d'aménagement et identification des enjeux principaux. Woodstock est utilisé comme logiciel de calcul.

Possibilité forestière et scénarios climatiques

Un étudiant au doctorat, Narayan Dhital, termine d'analyser plusieurs scénarios d'aménagement d'une forêt boréale de plus d'un million d'hectares (http://www.sfmnetwork.ca/docs/e/RN_En75_ConventionalAndEcosystemBasedMgmt_Dhital-Rauler.pdf). Des courbes de rendement sensibles au climat ont été élaborées et seront utilisées afin d'analyser la sensibilité des stratégies d'aménagement aux changements probables de productivité. La modification du régime de perturbation et de la dynamique de succession seront également prises en compte.

Analyse de viabilité de scénarios d'aménagement

Une étudiante au doctorat, Georgina Rodriguez, utilise l'analyse de viabilité des populations, une méthode d'analyse utilisée en biologie de la conservation, pour tester la robustesse des calculs de possibilité faits dans Woodstock face à des événements stochastiques comme les feux, les défoliations par les insectes, le chablis et la succession forestière.

Impact des effets de scénarios de défoliation sur la possibilité forestière

Un étudiant au doctorat, Guillaume Sainte-Marie, sous la direction de Dan Kneeshaw et Dave MacLean, s'intéresse à la protection des forêts contre la tordeuse des bourgeons de l'épinette et de ses effets sur les pertes de bois au Québec. Il utilise Woodstock pour explorer les effets sur la possibilité forestière.

University of Maine

FTY 477 Forest Management II

Integration of biophysical and socioeconomic sciences for multiple use management to achieve desired products, services, and conditions of forest lands. Application of modern analytical procedures for strategic, tactical and operational forest management planning up to the landscape level. This course utilizes a variety of software programs including the Landscape Management System and the Remsoft Spatial Planning System to expose students to techniques and tools. Together with FTY 476, satisfies the capstone requirement for the Forestry curriculum.

Spatial forest planning to meet multiple natural resource goals: Developing geospatial tools to forecast management outcomes across a diverse landscape of ownership types and stakeholder interests.

Modeling past and future impacts and interactions of alternative forest harvesting scenarios and potential spruce budworm outbreaks across multiple scales of forestland in Maine. Woodstock and Stanley are being used to project future forest conditions across a 14-township multi-owner forested landscapederived from satellite change detection dating back to the mid 1970s. Spruce budworm outbreak scenarios are also being modeled to evaluate potential interactions with management and impact on habitat.

Landscape Planning Initiative for Northern Maine Using Area Sensitive Umbrella Species

The goal of this project is to develop, implement, and evaluate a habitat management system useful in sustainably managing the large forestlands of northern Maine. We will use data from the Nature Conservancy (180,000 acres in northern Maine) as a sample landscape in which to evaluate our models. We will be using the Remsoft Spatial Planning System to translate forest harvest planning goals and alternatives into spatially-explicit management scenarios developed around lynx and marten habitat requirements.

Université de Moncton

FORS 4054 - Gestion intégrée des forêts I (Integrated Forest Management I)

Introduction au système de planification spatiale RSPS (6 exercices) :

1. Introduction à la syntaxe Woodstock
2. Introduction à la recherche dichotomique avec Woodstock (formulation et interprétation)
3. Recherche dichotomique avec Woodstock (formulation et interprétation)
4. Introduction à la programmation linéaire avec Woodstock (formulation et interprétation)
5. Programmation à buts multiples avec Woodstock (formulation et interprétation)
6. Introduction à Woodstock (configuration de la base de données spatiales, création des sections Landscape et Areas, création de cartes et de rapports)

Introduction to the RSPS spatial modeling system (6 exercises):

1. Introduction to Woodstock syntax
2. Introduction to binary search with Woodstock (formulation and interpretation)
3. Binary search with Woodstock (formulation and interpretation)
4. Introduction to linear programming with Woodstock (formulation and interpretation)
5. Goal Programming with Woodstock (formulation and interpretation)

6. Introduction to Woodstock (configuring spatial database, building Landscape and Areas sections, generating maps and reports)

FORS 4052- Gestion intégrée des forêts II (Integrated Forest Management II)

Les étudiants planifient et réalisent un inventaire multi-ressources pour un bloc de terres publiques (superficie variant entre 400 et 1400 hectares), créent des tables de peuplement, des tables de rendement (Staman), et des fenêtres d'habitat pour chaque type de peuplement pour plusieurs prescriptions sylvicoles potentielles. Ils subdivisent le territoire à l'étude en zones ayant différents objectifs d'aménagement et préparent un plan d'aménagement multi-ressources pour ce territoire en utilisant le système RSPS. Plusieurs scénarios sont testés pour un horizon de planification de 80 ans, et l'évolution temporelle de plusieurs indicateurs est évaluée, y compris les volumes ligneux, et des indicateurs écologiques et financiers. Un scénario est choisi parmi ceux testés et la répartition spatiale des activités d'aménagement associées à ce scénario est effectuée par période de 5 ans, et ce pour les 25 premières années de l'horizon de planification.

Students design and carry out a multi-resource inventory for a block of Crown Land (areas have varied between 400 and 1400 hectares), produce stand tables, yield tables (Staman) and habitat windows for each stand type for a number of different possible silvicultural prescriptions. They subdivide the area into zones with different management objectives, and prepare a multi-resource management plan for this area using the RSPS system. Several scenarios are tested for an 80 year planning horizon, with several indicators tracked through time, including timber volumes, ecological and financial indicators. A scenario is selected amongst those tested and management activities for this scenario are mapped out by 5-year periods for the first 25 years of the planning horizon.

University of New Brunswick

FOR 3006 - Forest Management

Continuation of FOR 3005. Introduction to linear programming in forest management. Introduction to elements of resource modeling and productivity assessment (e.g. water flow) at the stand level. Analysis of the impact of alternative interventions at the operational level and their integration with strategic and tactical plans, including: financial and socioeconomic evaluation of the forest management and resulting value flows; and risk management for Insect or pathogenic attacks and wildfire. Post-implementation assessment of activities as a critical part of the management process. Prerequisite: FOR 2006, FOR 3005, or permission of instructor.

FOR 4096 – Forest Landscape Design and Management

Integrates value-flow planning with landscape planning by: 1) introducing students to the concepts and techniques used in dealing with the spatial dimensions in forest management planning; 2) introducing students to the difficulties involved with management for a complex set of demands, where resources demanded have production functions that include complex spatial and temporal relationships of inputs, many of which are unknown; and 3) exposing students to techniques available to forecast landscape patterns resulting from flow driven management planning, and to design landscape patterns based on analysis of natural dynamics. Prerequisite: FOR 3006, or permission of instructor.

FOR 4020 – Management Practicum

Practical exercise in forest landscape management, designed to provide an opportunity of integrate skills and knowledge gained throughout the program. Forest Ecosystem Management and Forest Engineering students will work on the same project to design landscape management plans at the strategic, tactical

and operational levels. The practicum will be based on real forests. Through consultation with clients and/or members of the public, goals will be developed. Plans will be derived to integrate these goals. Teams will be responsible for project management, including planning, budgeting and report preparation.

Developing forest management strategies to reduce net forest and forest-sector greenhouse gas emissions

Consensus regarding optimum forest management (e.g., harvest rate, stand rotation age, wood product use – biofuel vs. long-term wood products) to minimize long-term forest and forest-sector net emissions (forest C sequestration minus emissions) remains unsettled and largely hinges on: 1) the comprehensiveness of C pools accounted (forest live and dead organic matter, wood product C storage in use and landfill, forest operation, manufacturing, and transportation emissions – e.g., lumber, biofuel), 2) parameterization of forest C dynamics, and 3) assumptions about forest natural disturbance rates. Recent advances in forest C modeling (e.g., Perez-Garcia et al. 2005; Hennigar et al. 2009; Kurz et al. 2009), significant regional industrial and public bioenergy investments, and continuing scientific debate regarding the role of the forest and forest-sector in GHG mitigation efforts have set the stage and need for a comprehensive regionally-calibrated forest biomass and GHG inventory accounting software tool. Such a tool would better link current C accounting and forest management models and provide forest managers with transparent and regionally calibrated forest and forest sector emission estimates. Such estimates are needed 1) to reliably quantify and project forest on- and off-site C storage, forest-sector emissions, and forest biofuel inventories; and 2) to quantify benefits (\$, C credits) of forest management derived C off-set and bioenergy projects when net forest (growth minus disturbances) and forest-sector emissions are considered.

Objectives of this project are to 1) develop software to calculate and forecast live tree biomass, site specific dead organic matter C, and C transfer and storage in wood products for Acadian forests and forest treatments using stand management models STAMAN and FVS; 2) identify and document GHG emissions resulting from JDI forest operations, product manufacturing, transport, and product use; 3) develop a software to easily parameterize and integrate 1) and 2) into strategic forest management models (Woodstock) used by JDI and other companies; and 4) use this GHG accounting-management frame-work on JDI lands to identify optimum forest policy to minimize net GHG emissions (forest and forest product C capture plus forest and forest sector emissions) over short (25 years) and long (200 years) terms. This modeling framework will provide regionally calibrated and detailed stand and forest level GHG sequestration and emission estimates for alternative management strategies for JDI and other forest lands. Sensitivity of biomass growth and decay rates as well as other parameters on resulting GHG and biomass dynamics under alternative management strategies will be explored.

Predicting impacts on balsam fir due to hemlock looper and balsam fir sawfly defoliation for decision support system.

Impacts resulting from balsam fir sawfly and hemlock looper defoliation have been synthesized for building a decision support system following the spruce budworm decision support system (SBWDSS) frame work. Based on the improved frame work, stand level impacts are implemented in Newfoundland and Labrador Department of Natural Resources forest management district 15 wood supply (Woodstock) model to get defoliation impacts on forest scale.

Integrated planning of timber harvest and bioenergy production for large forest areas: a case study for crown land of New Brunswick

Spatial Woodstock and linear programming were used to evaluate integration of bioenergy production into timber supply strategies for Crown land in New Brunswick. Harvest residues and pulpwood quality material used for energy, land allocated to willow energy plantations, and harvest timing and system preferences were explored in scenarios. Outputs estimated were biomass, gross and net bioenergy,

timber, CO₂e emissions in production, cost, and forest composition. The status quo scenario produced annual net bioenergy equivalent to ~34% of total bioenergy available from residues of clearcut harvesting, or ~5% of total energy use in New Brunswick, and maintained current forest composition objectives. Introducing 40 000 ha of willow energy plantations to the status quo scenario doubled bioenergy production (~10% of total energy use in New Brunswick) or reached approximately one-half the proportion of energy derived from forest biomass currently in Sweden. Additionally, this would be enough energy to offset approximately 15% of total fossil fuel energy consumption in the province.

Greenhouse gas emissions from forest operations and strategies to maximize net forest-sector carbon sequestration

Current literature has quantified greenhouse gas (GHG) emissions produced from forest operations (e.g., planting (Johnson et al. 2005), harvesting (Klvač and Skoupy 2009) and trucking (Johnson et al. 2005)), and milling (Bergman and Bove 2008). Potential for storing carbon (C) in both wood products and the forest for alternative management strategies has also been studied for the Acadian forest (Neilson et al. 2007, Hennigar et al. 2008). However, no study has taken a combined view to quantify the impact of including forest operation emissions when evaluating GHG reduction benefits of alternative forest management. This project will first evaluate the influence that forest operations (encompasses all silviculture, road construction, transportation, and manufacturing activities) emissions may have on alternate forest management choices (e.g., amount and intensity of timber or biomass harvesting) to minimize forest-level net GHG emissions (forest and forest product C stock change minus forest operation emissions) on a 2.375 million hectare industrial forestry landbase with area located in New Brunswick, Maine and Nova Scotia. Four management scenarios will be forecasted using Remsoft's Spatial Planning System Model (RSPS; Remsoft Inc. 2010): business as usual management (J.D. Irving Limited's, current management plan), maximize net carbon storage (in the forest and wood products), avoided GHG emissions from biomass energy production, and increased biomass harvest. Using provincial average wood product prices and operating costs, annual discounted net revenues (product/C expected revenues – operation costs) will be included as a performance indicator in the trade-off analysis, to show financial implications and [or] benefits of alternative management scenarios.

A sensitivity analysis will explore at the forest level, the impact of 9 stand replacing natural disturbance scenarios (e.g., fire, insect) on net GHG emissions across a matrix of plausible spatial extents and frequencies to elucidate the sensitivity of conclusions drawn from the previous analysis to uncertain future events. The significance of overall results to the inclusion of forest operation and milling GHG emissions will be explored, along with the sensitivity of GHG emissions associated with the production electricity, which is used by the milling facilities (ex. Using nuclear energy production rather than coal).

This project will attempt to address two main questions. What degree of influence do forest operation emissions have on management choices (harvest volume, method of removal and products produced) to reduce long-term GHG emissions when evaluated in concert with C sequestration potential of forests and forest products? What management strategies (forest treatment levels) provide cost-effective opportunities to minimize net GHG emissions for the Acadian forest region?

*Benefit-cost analysis of spruce budworm (*Choristoneura fumiferana* Clem.) control: incorporating market and non-market values*

This study employs a benefit-cost analysis (BCA) framework to estimate market and non-market benefits and costs of controlling future spruce budworm (SBW; *Choristoneura fumiferana*) outbreaks on Crown forest lands in New Brunswick, Canada. We used: (i) an advanced timber supply model to project potential timber volume saved, timber value benefits and costs of pest control efforts; and (ii) a recently conducted contingent valuation method (CVM) analysis that evaluated non-market benefits (i.e. changes

in recreation opportunities and existence values) of controlling future SBW outbreaks in the Province. A total of six alternative scenarios were evaluated, including two uncontrolled future SBW outbreak severities (moderate vs. severe) and, for each severity, three control program levels (protecting 10%, 20%, and 40% of the susceptible Crown land forest area). The economic criteria used to evaluate each SBW control program scenario included benefit-cost ratios (BCR) and net present values (NPV). Results indicated that the highest BCR and NPV occurred when protecting 10-20% (284,000-568,000 ha) of the susceptible area. The inclusion of non-market values generally increased the BCRs and NPVs of the control programs, and in some cases, led to higher levels of control being supported. Results of this study highlight the importance of including non-market values into the decision making process of forest pest management.

Université du Québec en Abitibi-Témiscam

Contribution des débris ligneux grossiers à la rétention du carbone en forêt boréale mixte, dans un contexte d'aménagement écosystémique.

Ce projet vise à déterminer l'importance du bois mort pour la séquestration du carbone dans les forêts boréales mixtes du Québec, et à évaluer les effets des coupes sur leur dynamique. Les forêts boréales constituent une réserve importante de carbone, principalement dans les sols, où la matière organique se décompose très lentement. Le bois mort, ou débris ligneux grossiers (DLG), représente une quantité substantielle de matière organique du sol, il constitue donc un pool de carbone important. L'aménagement forestier va modifier la dynamique des DLG et va avoir un impact considérable sur le cycle du carbone. Les coupes forestières génèrent des DLG, particulièrement des arbres morts au sol, au détriment des chicots. Suite à l'exportation du bois, elles diminuent la quantité de carbone total de l'écosystème, et modifient l'allocation du carbone dans les différents réservoirs (arbres, sous-bois, sol, débris ligneux grossiers). Dans le cadre de l'aménagement écosystémique, de nouvelles approches sylvicoles sont testées ; elles sont basées sur la diversification des interventions sylvicoles, de façon à mieux reproduire les conditions créées par les perturbations naturelles. Le passage d'un aménagement équié à un aménagement laissant après coupes différentes proportions de couvert végétal pourrait avoir un impact sur le rôle de la forêt de puits de carbone. Ce projet a pour objectifs (1) d'étudier le rôle des DLG dans la rétention du carbone via la formation de molécules stables et difficilement dégradables ; (2) d'étudier les effets des différents types de coupes (partielles, totales) sur la dynamique des DLG et la répartition du carbone dans les différents réservoirs de l'écosystème ; (3) d'améliorer les simulations des flux de carbone entre l'atmosphère et la forêt à partir du modèle CBM-CFS.

Effets des stratégies d'aménagement écosystémique sur le calcul de la possibilité forestière et le maintien de la mosaïque naturelle dans la sapinière à bouleau blanc de l'ouest.

La Forêt d'enseignement et de recherche du lac Duparquet (FERLD) a été établie par le gouvernement du Québec et est gérée par les Universités du Québec en Abitibi-Témiscamingue et à Montréal depuis 1995, comme une démonstration d'une approche d'aménagement forestier écosystémique (AFÉ). Basée en grande partie sur les connaissances de la dynamique naturelle et du fonctionnement des écosystèmes de la sapinière à bouleau blanc de l'ouest, l'approche d'AFÉ propose essentiellement: 1) de maintenir la structure d'âge et la composition de la mosaïque forestière naturelle à l'échelle du paysage et 2) d'intégrer la dynamique naturelle dans les pratiques sylvicoles à l'échelle du peuplement forestier. D'autres aspects touchant la gestion et la conservation du territoire ont aussi été implantées dont 1) l'inclusion d'une zone de conservation intégrale couvrant 25 % du territoire; 2) l'intégration d'une classification fine des milieux riverains, humides et aquatiques en vue de conservation des forêts de haute valeur de conservation; et 3) l'emploi de coupes partielles, variant de la coupe totale avec rétention variable jusqu'au jardinage. Bien que, conceptuellement, l'approche constitue un avancement pour

l'atteinte des objectifs biophysiques de l'aménagement forestier durable, l'impact à long terme de l'ensemble de ces mesures sur le maintien de la diversité écosystémique (l'ensemble des types de peuplements et des classes d'âge de la mosaïque naturelle) et sur la possibilité ligneuse, reste à vérifier. L'objectif de ce projet est de mesurer les impacts de chacune de stratégies de l'approche d'AFÉ de la FERLD sur la disponibilité des ressources ligneuses et sur la structure de la forêt via une analyse de la possibilité forestière et de l'évolution de la mosaïque sous aménagement. L'analyse considérera chacune des étapes menant au calcul de la possibilité forestière et fournira une documentation détaillée afin d'évaluer la pertinence des intrants utilisés lors des analyses.

Évaluation des stratégies en portefeuille- intégration de la valeur marginale des coupes partielles dans une stratégie écosystémique

Le projet porte sur l'évaluation de la viabilité financière des stratégies de coupes partielles par rapport à une stratégie de coupe totale (CPRS) et sur la modélisation de la chaîne de valeur liée à la certification(CFSC) des bois issus des peuplements en Abitibi-Témiscaminque. Un premier objectif sera de déterminer qu'elle serait la meilleure stratégie de reboisement, en termes de rentabilité financière, par rapport à la stratégie CPRS habituelle. À cette fin, une analyse marginale de diverses stratégies de coupes partielles sera effectuée de façon à vérifier si certains gradients de coupe sont rentables et si oui, lesquels. Au plan méthodologique la première étape consistera à développer une grille d'analyse financière et technique des stratégies de coupes partielles en collaboration avec un groupe restreint de spécialistes (interface foresterie/finance). Puis, avant de procéder à l'analyse proprement dite des stratégies retenues, une validation externe de la grille d'analyse sera faite auprès d'un groupe de partenaires externes, ceci afin d'évaluer l'impact possible des spécificités et contraintes institutionnelles susceptibles d'affecter l'évaluation des investissements dans ce domaine. Cette étape préalable a pour but d'améliorer la méthodologie grâce à l'expertise des praticiens en place; cette démarche assimilable à une analyse de cas pourra s'avérer particulièrement utile lorsque le même type de projets se répète, à quelques différences mineures près, dans plusieurs organisations du même réseau. La grille retenue constituera le résultat de la phase intelligence de l'analyse marginale des projets de coupes partielles par rapport à une coupe CPRS. L'évaluation de la viabilité financière d'un projet d'investissement repose sur une série de variables clés qui sont entachées d'incertitude. En effet, les flux financiers marginaux estimés sur la vie utile d'un projet découlent de prévisions pour une série de variables dont les valeurs sont elles-mêmes incertaines. À des variables financières s'ajoutent des paramètres techniques caractérisant les diverses stratégies de coupes partielles, certains de ces paramètres influençant la productivité et /ou, la valeur des bois à récolter. Or, les approches habituelles telles, par exemple, la valeur actualisée nette (VAN) et le taux de rendement interne (TRI) ignorent l'incertitude associée à l'estimation de la valeur des variables clés. Quatre approches permettant de prendre en compte l'incertitude associée aux variables clés d'un projet seront examinées: l'analyse de sensibilité, l'analyse de scénarii discrets, l'arbre de décision et la simulation en contexte probabiliste, c'est-à-dire avec des distributions de probabilités associées à chacune des variables clés. Le développement de modèles d'analyse de sensibilité, d'analyses de scénarii et de simulations permet d'évaluer l'impact de variation dans les paramètres de la décision sur la viabilité financière des projets c'est-à-dire de tenir compte de l'incertitude reliée à certains paramètres. Cette dernière étape vise à fournir aux décideurs des outils susceptibles d'éclairer leur jugement dans le sens d'un système d'aide à la décision. En effet, cette étape d'analyse financière plus approfondie sera particulièrement utile dans des projets où divers scénarios auront été développés par l'équipe responsable de l'évaluation d'un projet donné.

Waiariki Institute of Technology

Forest Estate Management

2010 has seen a lot of development work on our National Diploma in Forest Operations assessment and course material and as a consequence there hasn't been any teaching of Woodstock on our programme this year. There has been however, a lot of development work towards the teaching of Woodstock on our Diploma in forest management programme for 2011. This process was started with a superb Remsoft training workshop run by Andrew Cogswell (Remsoft) in Rotorua , New Zealand in May of this year. The tutorial template from this workshop will provide a good base for a Diploma tutorial on regime analysis for a small forest. The tutorial will focus on clearwood versus framing regimes for radiata pine but could also look at an exclusive carbon regime or a combined carbon/traditional forestry regime. The forest management team at Waiariki Institute of Technology has been gathering forest information and inventory data in preparation for the Semester 2 2011 Diploma Woodstock tutorial.

The forest management team will also look integrating the Stanley and Allocation Optimizer modules as part of our training. Lots of work to do but we're looking forward to it!