
FSTY 315 – Forest Soil Management

September 2006

Lecture: Wednesday, 1830 – 2020

LAB8 8-161

Labs: Friday, 800 – 1050

LAB8 8-231

Instructor: Paul Sanborn	Office hours: Mon., 13:30-14:30 Wed., 13:30-14:30 Fri., 14:30-15:30 (or by appointment)	Office location: 8-308 (Teaching Lab Bldg)
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Prerequisites - FSTY 205 or permission of instructor

Course description:

This course will examine the physical, chemical and biological determinants of forest soil productivity and introduce the basic principles of forest site classification, emphasizing systems used in British Columbia. Forest practices in all phases of land management (harvesting, site preparation, stand tending) will be examined to provide an understanding of their effects on soil properties and productivity. The regulatory framework governing soil conservation in B.C. forestry will be reviewed, along with methods used to restore productivity to damaged forest soils. Field trips and laboratory exercises will provide experience in techniques for assessing forest soil properties and management impacts.

Course objectives – Upon completion of this course, students should have a good understanding of:

- soil determinants of forest site productivity, emphasizing British Columbia
- major site classification systems & their scientific basis
- contrasting behaviour patterns of major nutrient element cycles in boreal and temperate forest soils
- impacts of forest harvesting and silvicultural practices on soil productivity
- roles and management of soil organic matter in boreal and temperate forests
- regulation and assessment of soil disturbance in BC
- rehabilitation of damaged forest soils
- diagnosis and treatment of nutrient deficiencies

Evaluation of Student Performance:

One mid-term exam @10% (Oct 18)	10%
Final exam	30%
Term paper & class presentation (<i>details to follow</i>)	20%
Laboratory and field trip reports and exercises	40%
<hr/> Total	<hr/> 100%

IMPORTANT!

EXTENSIONS on assignments will only be permitted in the event of illness or other serious extenuating circumstances. In such circumstances, **the student** must inform the Instructor **before** the due date, or as promptly as practicable thereafter, and documentary evidence of the illness or other circumstance must be provided to the instructor (*e.g.* note from doctor). In all other cases, 10% per day will be deducted from the grade given for a late assignment.

EXAM POLICY: Please note that the term ends on the final day of the exam period, **NOT** on the last day of classes. Students are advised not to make arrangements to travel on a date prior to the date of the final exam as scheduled by the Registrar. The Instructor will not hold early exams for the purpose of accommodating travel requests.

PLAGIARISM is a very serious academic offense, and will not be tolerated by the instructor, the Program or the University. Consult the Calendar for full details on the UNBC policy regarding plagiarism. If you need advice on how to use and cite sources correctly, speak to the instructor or consult these useful Web sites:

<http://www.utoronto.ca/writing/plagsep.html>

<http://www.ecf.toronto.edu/~writing/interactive-plagiarismtest.html>

http://www.yorku.ca/tutorial/academic_integrity/index.html

Course Materials:

Lecture Notes:

- PDF versions of the Powerpoint lecture presentations will be available in the FSTY 315 course folder on the student G: drive (other materials, such as problem sets and solutions, and some of the required readings, will also be distributed in this way)

Required Readings:

I am not prescribing a textbook for this course. I have placed Fisher & Binkley, Ecology and Management of Forest Soils (3rd ed.) on reserve but it is too expensive for the amount of use that we will make of it. I will indicate some sections that are valuable, but to supplement and reinforce the lectures, I will rely primarily on research articles and important government publications. I will provide PDFs (or web links) or paper copies.

Wear appropriate clothing and footwear for field trips. We will have a couple of “wet labs” later in the course, and you will need to bring a lab coat, along with your lab safety orientation card.

If there are students in this course who, because of a disability, may have a need for special academic accommodations, please come and discuss this with me, or contact Disability Services located in room 7-103.

Useful Resources

This is not a reading list – just some important sources of information that will help you in following up on particular topics or getting additional background.

(1) Books in UNBC Library:

- Bowen GD, Nambiar EKS, editors. 1984. Nutrition of plantation forests. London: Academic Press. 516 p.
- Cairns J Jr., editor. 1995. Rehabilitating damaged ecosystems. 2nd ed. Boca Raton: Lewis Publishers. 425 p.
- Chappell HN, Weetman GF, Miller RE, editors. 1992. Forest fertilization: sustaining and improving nutrition and growth of western forests. Seattle: College of Forest Resources, University of Washington. 302 p.
- Cole DW, Gessel SP, editors. 1988. Forest site evaluation and long-term productivity. Seattle: University of Washington Press. 196 p.
- Dvorak J, Novak L, editors. 1994. Soil conservation and silviculture. Amsterdam: Elsevier. 399 p.
- Dyck WJ, Cole DW, Comerford NB, editors. 1994. Impacts of forest harvesting on long-term site productivity. London: Chapman & Hall. 371 p.
- Fisher RF, Binkley D. 2000. Ecology and management of forest soils. 3rd ed. New York: Wiley. 489 p.
- Green RN, Trowbridge RL, Klinka K. 1993. Towards a taxonomic classification of humus forms. For. Sci. Monogr. 29. 49 p.
- Heilman PE, Anderson HW, Baumgartner DM, editors. 1979. Forest soils of the Douglas-fir region. Pullman: Washington State University. 298 p.
- Lavender DP et al., editors. 1990. Regenerating British Columbia's forests. Vancouver: University of British Columbia Press. 372 p.
- Lousier JD, editor. 1998. Ecology and management of northern forest soils conference (UNBC). Prince George: Madrone Consultants. 306 p.
- Marschner, H. 2002. Mineral nutrition of higher plants. 2nd ed. Amsterdam: Academic Press. 889 p.
- McFee WW, Kelly JM, editors. 1995. Carbon forms and functions in forest soils. Madison, Soil Science Society of America. 594 p.
- Perry DA. 1994. Forest ecosystems. Baltimore: Johns Hopkins University Press. 649 p.
- Perry DA et al., editors. 1989. Maintaining the long-term productivity of Pacific Northwest forest ecosystems. Portland: Timber Press. 256 p.
- Richter DD Jr., Markewitz D. 2001. Understanding soil change. Cambridge: Cambridge University Press. 255 p.
- Valentine KWG. 1986. Soil resource surveys for forestry. Oxford: Clarendon Press. 147 p.
- Van Breemen N, editor. 1998. Plant-induced soil changes: processes and feedbacks. Dordrecht: Kluwer Academic Publishers. 252 p.
- Van den Driessche, R. 1991. Mineral nutrition of conifer seedlings. Boca Raton: CRC Press. 274 p.

(2) Government publications available online:

- Ballard TM, Carter RE. 1985. Evaluating forest stand nutrient status. Land Manage. Rep. 20. Victoria: Ministry of Forests. 60 p.
<http://www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Lmr/Lmr020.pdf>
- Brown KR. 1999. Mineral nutrition and fertilization of deciduous broadleaved tree species in British Columbia. Work. Pap. 42. Victoria: Ministry of Forests. 52 p.
<http://www.for.gov.bc.ca/hfd/pubs/Docs/Wp/Wp42.htm>
- Bulmer CE. 1998. Forest soil rehabilitation in British Columbia: a problem analysis. Land Manage. Handb. 44. Victoria: Ministry of Forests. 45 p.
<http://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh44.htm>
- Lousier JD, Still GW. 1988. Degradation of forested land: "forest soils at risk". Land Manage. Rep. 56. Victoria: Ministry of Forests. 331 p.
<http://www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Lmr/Lmr056.pdf>
- Lousier JD. 1990. Impacts of forest harvesting and regeneration on forest sites. Land Manage. Rep. 67. Victoria: Ministry of Forests. 92 p.
<http://www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Lmr067.htm>
- Meidinger D, Pojar J, editors. 1991. Ecosystems of British Columbia. Sp. Rep. 6. Victoria: Ministry of Forests. 330 p. <http://www.for.gov.bc.ca/hfd/pubs/Docs/Srs/SRseries.htm>
- Ministry of Forests. 1998. Field manual for describing terrestrial ecosystems. Land Manage. Handb. 25. Victoria: Ministry of Forests.
<http://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh25.htm>
- Ministry of Forests. 1997. Soil rehabilitation guidebook. Forest Practices Code of British Columbia. Victoria: Ministry of Forests.
<http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/soilreha/rehabtoc.htm>
- Ministry of Forests. 2001. Soil conservation guidebook. (2nd ed.) Forest Practices Code of British Columbia. Victoria: Ministry of Forests.
<http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/SOILSURV/soilconsurv.pdf>
- Ministry of Forests. 2001. Soil conservation surveys guidebook. (2nd ed.) Forest Practices Code of British Columbia. Victoria: Ministry of Forests.
<http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/SOIL/Soilcol.pdf>
- Stathers RJ, Spittlehouse DL. 1990. Seedling microclimate. Land Manage. Rep. 65. Victoria: Ministry of Forests. 28 p.
<http://www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Lmr065.htm>
- Stathers RJ, Spittlehouse DL. 1990. Forest temperature manual. FRDA Report 130. Victoria: Ministry of Forests. 47 p. <http://www.for.gov.bc.ca/hfd/pubs/Docs/Frr/Frr130.htm>
- Stevens V. 1997. The ecological role of coarse woody debris: an overview of the ecological importance of CWD in BC forests. Work. Pap. 30. Victoria: Ministry of Forests. 26 p.
<http://www.for.gov.bc.ca/hfd/pubs/Docs/Wp/Wp30.htm>

(3) Journals & Indexes

Forest soils research is reported in both forestry and soil science journals. The following are major journals that we have in UNBC's collection (paper copies and/or electronic access):

Biogeochemistry
Biology and Fertility of Soils
Canadian Journal of Forest Research
Canadian Journal of Soil Science
Forest Ecology and Management
Forest Science
Soil Biology and Biochemistry
Soil Science Society of America Journal

The two most useful indexes for searching the forest soils literature are:

Agricola
Forest Science Database

FSTY 315: Outline and Schedule (Fall 2006)

(Note: Midterm date is fixed, but there may be some change in the scheduling of specific lecture and lab topics.)

Week - Date	Lecture	Lab / field trip
1 – Sept 4	Introduction: soil determinants of forest productivity	Review exercise: basic soil calculations
2 – Sept 11	Forest site classification	Site classification: on-campus walkabout
3 – Sept 18	Soil organic matter: ecological roles and management	Coarse woody debris survey methods: local field trip
4 – Sept 25	Soil porosity and compaction	Saturday (Sept 30) field trip: Aleza Lake Research Forest
5 – Oct 2	Soil thermal regimes in forests and how forest practices can alter them	<i>(no lab)</i>
6 – Oct 9	Soil nutrient cycles (part 1)	Mineralizable nitrogen (part 1)
7 – Oct 16	Midterm Exam	Forest nutrient budgets: spreadsheet exercise
8 – Oct 23	Soil nutrient cycles (part 2)	Mineralizable nitrogen (part 2)
9 – Oct 30	Soil nutrient cycles (part 3)	Diagnosing nutrient deficiencies (part 1): soil assays
10 – Nov 6	Soil nutrient management: fertilization, fire, harvesting intensity & site preparation	<i>(no lab)</i> Remembrance Day Holiday
11 – Nov 13	Soil disturbance: causes, consequences, regulation	Diagnosing nutrient deficiencies (part 2): foliar analysis interpretations
12 – Nov 20	Soil rehabilitation: methods for restoring productivity	Measuring and interpreting fertilization responses
13 – Nov 27	Putting it all together: sustaining long-term site productivity	Student presentations <i>(Term papers due)</i>
14 – Dec 4	<i>(no lecture – Dec. 4 is last day of classes)</i>	<i>(no lab)</i>