

SIMON FRASER UNIVERSITY

OFFICE OF THE VICE-PRESIDENT, ACADEMIC

S.96-46
As amended by
Senate
316/96

MEMORANDUM

To: Senate

From: D. Gagan, Chair *David Gagan*
Senate Committee on Academic Planning

Subject: School of Resource and Environmental Management -
Undergraduate Program in Resource and Environmental Management

Date: May 15, 1996

Action undertaken by the Senate Committee on Undergraduate Studies and the Senate Committee on Academic Planning gives rise to the following motion:

Motion:

"that Senate give academic approval^{to} and recommend^{for} approval to the Board of Governors, as set forth in S.96-46, the revised and renamed undergraduate program in Resource and Environmental Management

New courses:

- REM 303-3 Introduction to Planning Thought
- REM 311-3 Applied Ecology and Sustainable Environments
- REM 313-3 Fisheries Management: An Introduction
- REM 320-3 Introduction to Nature Resource Dynamics, Analysis, and Management
- REM 330-3 Applications of Geographic Information Systems in Resource and Environmental Management
- REM 331-3 Applied Watershed Hydrology
- REM 340-3 Environmental Conflict and Public Involvement in Decision Making
- REM 341-3 Environmental and Resource Law
- REM 342-3 Principles of Sustainable Environmental Planning and Management
- REM 343-3 Decision Making in Resource and Environmental Management
- REM 346-3 Impact Assessment
- REM 347-3 Planning and Management of Protected Areas

- REM 350-3 Energy Planning and Management
- REM 356-3 Institutions for Sustainable Environmental Management
- REM 360-3 Special Topics in Environmental Planning and Management
- REM 404-3 Methods and Tools for Resource Planning and Management
- REM 410-3 Environmental Quality Assessment and Management
- REM 412-3 Environmental Modeling
- REM 420-3 Advanced Natural Resource Dynamics, Analysis, and Management
- REM 445-3 Environmental Risk Assessment and Management of Hazardous Substances
- REM 446-3 Resource and Environmental Management for First Nations
- REM 448-3 Tourism Planning and Management
- REM 455-3 Water Planning and Management
- REM 460-3 Special Topics in Environmental Planning and Management
- REM 464-3 Directed Study in Advanced Resource and Environmental Planning Topic
- REM 471-3 Forest Ecosystem Management
- REM 475-3 Freshwater Ecosystem Management
- REM 477-3 Applied Conservation Biology."

Please note: The degree title has been changed

From: Bachelor of Science (Environmental Planning and Management)
 To: Bachelor of Resource and Environmental Management

The main document has been amended to reflect this change, but some of the appendices still refer to ENPL. References to ENPL should be taken to refer to REM (Resource and Environmental Management).

SIMON FRASER UNIVERSITY
SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT
MEMORANDUM

TO: Alison Watt

FROM: Dr. Frank Gobas
Director
School of Resource and Environmental Management

DATE: May 13, 1996

SUBJECT: BREM Degree

Attached is the undergraduate proposal from the School of Resource and Environmental Management. This was originally submitted as a proposal for a Bachelor of Science in Environmental Planning and Management [BSc(ENPL)]. We have now changed the name of the proposed degree program to Bachelor of Resource and Environmental Management (BREM). This name change was approved by REM faculty and the Faculty of Applied Sciences.

ENPL 100 (Global Change) and ENPL 200 (Environmental Dynamics) received prior Senate approval. For the purposes of the new document, we have changed the names of these two courses to REM 100 and REM 200 to make them consistent with the other proposed course names. When the undergraduate program is approved, we will complete the documentation required to change the names of these courses from ENPL 100 and ENPL 200 to REM 100 and REM 200.



Frank Gobas
FG/jr

Parveen Bawa

**Proposal for a Bachelor's Degree in
Resource and Environmental Management
(BREM)**

**School of Resource and Environmental Management
Faculty of Applied Sciences
Simon Fraser University
Burnaby, British Columbia V5A 1S6**

9 May 1996

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I GENERAL INFORMATION**1. Program Title**

Bachelor of Resource and Environmental Management (BREM)

2. Credential to be awarded to graduates

Bachelor of Resource and Environmental Management (BREM)

3. Faculty and School to offer the program

School of Resource and Environmental Management
Faculty of Applied Sciences
Simon Fraser University
Burnaby, British Columbia

4. In December 1991, the Senate Committee on Academic Planning requested the School of Resource and Environmental Management to develop an interdisciplinary undergraduate program in environmental studies in conjunction with Biological Sciences and Geography .**5. Schedule for implementation**

Admit first students in the fall of 1997
First graduates in Spring semester, 2001

II DESCRIPTION OF THE BACHELOR OF RESOURCE AND ENVIRONMENTAL MANAGEMENT PROGRAM (BREM)

Simon Fraser University's School of Resource and Environmental Management is currently an interdisciplinary graduate program. Established in 1979, it has a faculty of 9.75 full-time equivalent members with interests covering the natural, economic, social, and management sciences. The school currently offers masters (MRM) and Ph.D. degrees. Until December 1995, 171 students have graduated from the masters program; the first Ph.D. class was admitted in September 1994. Having established a successful graduate program and to meet the growing demand for a new kind of socially relevant education in this growing and important field, we propose to establish a new degree program, a Bachelor of Resource and Environmental Management (BREM).

Objectives

There are two objectives for the proposed BREM program: (1) to educate a new kind of manager to meet emerging provincial, national, and global challenges in the field of sustainable environmental management, and (2) to provide a degree in the environmental field at Simon Fraser University to complement a BA degree in Environmental Studies in the Faculty of Arts. It will also provide a service function by making applied planning and management courses available to students in other faculties and departments.

The School of Resource and Environmental Management

The School of Resource and Environmental Management (REM) was established in 1979 under the name of the Natural Resources Management Program. Since its inception, it has been an interdisciplinary graduate program, having faculty and students with backgrounds in the natural, economic, social, and management sciences. Students in the masters program take an integrated sequence of courses in complementary fields, pursue additional courses to deepen their expertise in some specialty, and complete a research project on a topic that involves more than one traditional discipline. Faculty are actively involved not only in basic and applied research but also in collaborative work with various environmental management agencies. Through REM's formal cooperative education program, students can take up to two co-op work terms with a resource management organization or firm to gain professional experience. Because of their unique training, graduates from REM's masters program are in high demand by employers.

The experience and talents of REM's graduate faculty in resource and environmental management education will be used to create and deliver a unique undergraduate degree in environmental planning and management.

The BREM Program and the Mission of the University

Given the importance of natural resources and the environment in the economy of Canada, and particularly in the Province of British Columbia, it is logical that there be specialized professionals in this field trained at BC's publicly funded universities. Sustainable management of natural resources and the environment requires interdisciplinary skills and an appreciation of the principles and research

findings in related fields. These include biology, business, chemistry, communications, economics, geography, geology, hydrology, planning, sociology, and statistics, among many others. No similar BSc program exists in Canada or British Columbia.

Simon Fraser University is the logical home for such a program as the university is well-known for innovative offerings in a variety of socially relevant disciplines. The proposed program will extend that tradition by building on the existing masters and Ph.D. degrees in the School of Resource and Environmental Management, as well as a wide variety of existing undergraduate courses in the faculties of arts, business, science, and applied science. Based on the experience of the masters program, the BREM degree should attract equal numbers of female and male students.

Interdisciplinary and Disciplinary Environmental Departments and Programs at Canadian Universities

Of more than 280 postsecondary institutions in Canada which had environmental components in their curricula as of August 1993, the majority are associated with traditional disciplinary programs in the faculties of arts, sciences, and applied sciences. A number of universities have established undergraduate programs in environmental studies. The best known of these programs are at the universities of Brock, Guelph, Trent, Waterloo, and York in Ontario. In the Maritime Provinces and Newfoundland, only Saint Mary's University has created an environmental studies program. In Quebec, only Laval has established such a program. Each of the Prairie Provinces has one integrated course of studies. These are located at the universities of Winnipeg, Saskatchewan, Alberta, and Athabasca. In British Columbia, the universities of Victoria and British Columbia both have programs of studies related to the environment. However, in no Canadian province is there an interdisciplinary program in planning and management of natural resources which is similar in design to the program proposed here.

The Proposed Bachelor of Resource and Environmental Management

The proposed Bachelor of Resource and Environmental Management Program is summarized in Table I. This program is eclectic by design. In addition to the 2 transdisciplinary courses created for the entire university, majors students will take 13 lower division required courses and 5 lower division electives from the science, arts, business, and applied sciences departments. At the upper division there will be 12 required core courses and 6 electives and 3 or 4 credits in optional courses. Honors students will take 14 required courses, including two transdisciplinary courses (i.e. REM 404 and REM 464) especially designed for honors students, as well as 7 electives and 6 credits in optional courses. A minimum of 120 credit hours is required to complete the major degree program, 132 credit hours to complete the honors program.

TABLE 1

LOWER LEVEL REQUIREMENTS
(Semesters 1 to 4: For all majors and honors students)

Course Number	Credit Hours	Course Name	Prerequisites Required	Total Credit hrs	Total No. of courses
REQUIRED TRANSDISCIPLINARY COURSES					
REM 100	3	Global Change	None	3	1
REM 200	3	Environmental Dynamics	REM 100	6	2
REQUIRED DISCIPLINARY COURSES					
BISC 101	4	General Biology	High School Biology 12 or BISC 100	10	3
BISC 102	4	General Biology	High School Biology 12 or BISC 100	14	4
BISC 204	3	Introduction to Ecology	BISC 101 and BISC 102	17	5
CHEM 102	3	General Chemistry I	High School Chemistry 12 or CHEM 101	20	6
CHEM 115	2	General Chemistry Laboratory I	High School Chemistry 12 or CHEM 106	22	7
CMPT 100 or CMPT 101 or CMPT 1101	3 OR 4	Software Packages and Programming Modula 2 Event-Driven Programming in Visual Basic	BC MATH 12 or MATH 100 or MATH 110 BC CMPT SC 12, or CMPT 098 and MATH 100 BC MATH 12 or MATH 100 or MATH 110	25 or 26	8
ECON 103	3	Principles of Microeconomics	12 credit hours	28 or 29	9
ECON 105	3	Principles of Macroeconomics	12 credit hours	31 or 32	10
GEOG 100	3	Human Geography	None	34 or 35	11
GEOG 111	3	Physical Geography	None	37 or 38	12
GEOG 214	3	Climatology I	GEOG 111	40 or 41	13
MATH 151 or MATH 154 or MATH 157	3	Calculus I Calculus I for the Biological Sciences Calculus for the Social Sciences I	BC MATH 12 with a B grade or MATH 100 BC Math 12 with a B grade or MATH 100 BC Math 12 with a B grade or MATH 110 or 100	43 or 44	14
STAT 101 or STAT 103 or STAT 301	3	Introduction to Statistics, Option A Introduction to Statistics for Social Sciences Statistics for the Life Sciences	BC High School MATH 11 BC High School MATH 11 or Basic Algebra 30 credit hours including MATH 152 or 155	46 or 47	15

1. CMPT 110 is a newly approved course and is not listed in the 1995-96 calendar.

LOWER LEVEL REQUIREMENTS Continued.

Course Number	Credit Hours	Course Name	Prerequisites	Total Credit Hrs	Total No. of Courses
ELECTIVES: Take 5 of the following lower division courses 1. Ensure to register in appropriate prerequisites for the specialized upper division optional REM courses.					
BUS 272	3	Behaviour in Organizations	15 credit hrs: one of ENGL 101, 102, 103, 104, PHIL 001, 100, 120		
CMNS 110	3	Introduction to Communication Studies	None		
ENGL 101 or ENGL 199	3	Introduction to Fiction University Writing	None None		
HIST 102 or HIST 201	3	Canada Since Confederation The History of Western Canada	None None		
MATH 152 or MATH 155	3	Calculus II Calculus II for the Biological Sciences	Math 151 or 154; or Math 157 with grade of A or B Math 151 or 154; or Math 157 with grade of A or B		
MATH 310	3	Introduction to Ordinary Differential Equations	Math 152 or 155; or Math 158 with grade of A or B		
PHIL 120	3	Introduction to Moral Philosophy	None		
POL 100	3	Introduction to Politics and Government	None		
POL 231	3	Introduction to Comparative Government and Politics	POL 100	15	5
SUMMARY		TOTAL LOWER DIVISION		61 or 62	20

1 Or others of your choice with the approval of the Undergraduate Coordinator

2 For students who intend to pursue an international career, foreign language training can be useful.

UPPER LEVEL REQUIREMENTS FOR MAJORS
(Semesters 5 to 8: For all Majors students)

Course Number	Credit Hours	Course Name	Prerequisites	Total Credit hrs.	Total No. courses
REQUIRED COURSES					
BISC 312	3	Environmental Toxicology I	<i>BISC 101, 102</i>	3	1
REM 311	3	Applied Ecology and Sustainable Environments	<i>REM 100, 200, BISC 204, STAT 101 or equiv., MATH 154 or equiv.</i>	6	2
REM 320	3	Introduction to Natural Resource Dynamics, Analysis, and Mangement	<i>REM 100, 200</i>	9	3
REM 342	3	Principles of Sustainable Environmental Planning and Management	<i>REM 100, 200</i>	12	4
REM 343	3	Decision Making in Resource and Environmental Management	<i>REM 100, 200, 311, and 356</i>	15	5
REM 356	3	Institutional Arrangements for Sustainable Environmental Management	<i>REM 100, 200</i>	18	6
REM 420	3	Advanced Dynamics, Analysis, and Management of Natural Resources	<i>REM 100, 200, and 320, MATH 151 or 154 or 157, STAT 101 or 103 or 301</i>	21	7
REM 445	3	Environmental Risk Assessment and Management of Hazardous Substances	<i>REM 100, 200, BISC 312, CHEM 102, 115, MATH 151 or 154, or 157, STAT 101 or 103 or 301</i>	24	8
REM 477	3	Applied Conservation Biology	<i>REM 100, 200, and 311</i>	27	9
GEOG 389	3	Human Ecology	<i>REM 100, 200</i>	30	10
GEOG 445	4	Resource Planning ¹	<i>REM 100, 200, and one of REM 311, REM 316 or REM 356</i>	34	11
GEOG 450	3	Workshop: Sustainable Environmental Management	<i>REM 100, 200, 311, 356, GEOG 389 and 445</i>	37	12
		SUMMARY		37	12
ELECTIVES					
<i>(Take any 6 of the following courses)</i>					
REM 303	3	Introduction to Planning Thought	<i>REM 100, 200</i>		
REM 313	3	Fisheries Management: An Introduction	<i>REM 100, 200, 311, STAT 101, or 103 or 301t</i>		
REM 330	3	Applications of Geographic Information Systems in Resource and Environmental Management	<i>REM 100, 200</i>		
REM 331	3	Applied Watershed Hydrology	<i>REM 100, 200</i>		
REM 340	3	Environmental Conflict and Public Involvement in Decision Making	<i>REM 100, 200</i>		
REM 341	3	Environmental and Resource Law	<i>REM 100, 200</i>		
REM 346	3	Impact Assessment	<i>REM 100, 200, 342</i>		
REM 347	3	Planning and Management of Protected Areas	<i>REM 100, 200, GEOG 214</i>		

REM 350	3	Energy Planning and Management	REM 100, 200, ECON 103 and 105		
REM 404	3	Methods and Tools for Resource Planning and Management	REM 100, 200, MATH 151 or 154 or 157, STAT 101 or, 103 or 301		
REM 410	3	Environmental Quality Assessment and Management	REM 100, 200		
REM 412	3	Environmental Modeling	REM 100, 200, BISC 204, MATH 151 or 154 or 157, MATH 152 or 155, MATH 310, STAT 101 or 103 or 301		
REM 446	3	Resource and Environmental Management for First Nations	REM 100, 200, 311, 342, 343, 356		
REM 448	3	Tourism Planning and Management	REM 100, 200, 311, 356, 347, GEOG 389 and BISC 312		
REM 455	3	Water Planning and Management	REM 100, 200, 331		
REM 471	3	Forest Ecosystem Management	REM 100, 200, 311, 356, ECON 103, 105		
REM 475	3	Freshwater Ecosystem Management	REM 100, 200, 311		
REM 360	3	Special Topics in Resource and Environmental Management	REM 100, 200 and others to be specified		
REM 460	3	Special Topics in Resource and Environmental Management	REM 100, 200 and others to be specified	55	18
OPTIONAL COURSES					
	3 or 4	Majors select as many courses as needed from any faculty to satisfy the minimum credit hours required for the majors programs ²		58 or 59	19, 20 or 21
SUMMARY		TOTAL MAJORS REQUIREMENTS		58 or 59	19, 20 or 21

1 For BREM students GEOG 322 or Geog 385 are not required prerequisites for course GEOG 445 (see attached Appendix 2B.)

2 Consult the Resource and Environment undergraduate advisor for a list of appropriate electives from the Arts, Applied Sciences, Business, and Science faculties.

UPPER LEVEL REQUIREMENTS FOR HONORS DEGREE
(Semesters 5 to 8: For All Honors Students)

Course Number	Credit Hours	Course Name	Prerequisites	Total Credit hrs.	Total No. courses
REQUIRED COURSES					
BISC 312	3	Environmental Toxicology I	BISC 101 and 102	3	1
REM 311	3	Applied Ecology and Sustainable Environments	REM 100, 200, BISC 204, STAT 101 or equiv., MATH 154 or equiv.	6	2
REM 320	3	Introduction to Natural Resource Dynamics, Analysis, and Management	REM 100, 200	9	3
REM 342	3	Principles of Sustainable Environmental Planning and Management	REM 100, 200	12	4
REM 343	3	Decision Making in Resource and Environmental Management	REM 100, 200, 311, 356	15	5
REM 356	3	Institutional Arrangements for Sustainable Environmental Management	REM 100, 200	18	6
REM 404	3	Methods and Tools for Resource Planning and Management ¹	REM 100, 200, MATH 151 or 154 or 157, STAT 101 or 103 or 301	21	7
REM 420	3	Advanced Dynamics, Analysis, and Management of Natural Resources	REM 100, 200, and 320, MATH 151 or 154 or 157, STAT 101 or 103 or 301	24	8
REM 445	3	Environmental Risk Assessment and Management of Hazardous Substances	REM 100, 200, BISC 312, CHEM 102, 115, MATH 151 or 154, STAT 101 or 103 or 301	27	9
REM 464	4	Directed Study in Advanced Resource and Environmental Planning Topics ²	Permission of Dept. Honors students in 4th year only.	31	10
REM 477	3	Applied Conservation Biology	REM 100, 200, 311	34	11
GEOG 389	3	Human Ecology	REM 100, 200	37	12
GEOG 445	4	Resource Planning ³	REM 100, 200 and one of REM 311, REM 316 or REM 356	41	13
GEOG 450	3	Workshop: Sustainable Environmental Management	REM 100, 200, 311, 356, GEOG 389 and 445	44	14
ELECTIVES (Take any 7 of the following courses)					
REM 303	3	Introduction to Planning Thought	REM 100, 200		
REM 313	3	Fisheries Management: An Introduction	REM 100, 200, 311, STAT 101, 103 or 301		
REM 330	3	Applications of Geographic Information Systems in Resource and Environmental Management	REM 100, 200		
REM 331	3	Applied Watershed Hydrology	REM 100, 200		
REM 340	3	Environmental Conflict and Public Involvement in Decision Making	REM 100, 200		
REM 341	3	Environmental and Resource Law	REM 100, 200		
REM 346	3	Impact Assessment	REM 100, 200, 342		

REM 347	3	Planning and Management of Protected Areas	REM 100, 200, GEOG 214		
REM 350	3	Energy Planning and Management	REM 100, 200, ECON 103 and 105		
REM 410	3	Environmental Quality Assessment and Management	REM 100, 200		
REM 412	3	Environmental Modeling	REM 100, 200, BISC 204, MATH 151 or 154 or 157, MATH 152 or 155 MATH 310, STAT 101 or, 103 or 301		
REM 446	3	Resource and Environmental Management for First Nations	REM 100, 200, 311, 342, 343, 356		
REM 448	3	Tourism Planning and Management	REM 100, 200, 311, 356, 347, GEOG 389 and BISC 312		
REM 455	3	Water Planning and Management	REM 100, 200, 331		
REM 471	3	Forest Ecosystem Management	REM 100, 200, 311, 356, ECON 103, 105		
REM 475	3	Freshwater Ecosystem Management	REM 100, 200, 311		
REM 360	3	Special Topics in Resource and Environmental Management	REM 100, 200 and others to be specified		
REM 460	3	Special Topics in Resource and Environmental Management	REM 100, 200 and others to be specified	65	21
OPTIONAL COURSES					
	6	Honors select any 2 courses from any faculty as needed to satisfy the minimum credit hours required for the honors program. ⁴		71	23
SUMMARY		TOTAL HONORS REQUIREMENTS		71	23

¹ Available to all students (transdisciplinary course).

² For honors students only.

³ For BREM students GEOG 322 or Geog 385 are not required prerequisites for course GEOG 445 (see attached Appendix 2B).

⁴ Consult the Resource and Environmental Management undergraduate advisor for a list of appropriate electives from the Arts, Applied Sciences, Business, and Science faculties.

Of the 65 courses listed as part of the proposed curriculum, there are 30 new credit courses. There are also 4 new non-credit courses designated to Co-op work terms (REM 390-0, REM 391-0, REM 490-0 and REM 491-0).

The new credit courses are:

GEOG 389-3	REM 343-3	REM 420-3
GEOG 450-3	REM 346-3	REM 445-3
REM 303-3	REM 346-3	REM 446-3
REM 311-3	REM 347-3	REM 448-3
REM 313-3	REM 350-3	REM 455-3
REM 320-3	REM 356-3	REM 460-3
REM 330-3	REM 460-3	REM 464-4
REM 331-3	REM 404-3	REM 471-3
REM 340-3	REM 410-3	REM 475-3
REM 342-3	REM 412-3	REM 477-3

REM 100 and REM 200 were previously approved and are not included in this proposal. Proposals for the new REM courses are included in appendix 2. GEOG 389 and GEOG 450 have been approved by Senate (S95-67).

Timetable for Implementation and Enrollment

It is proposed that the BREM degree should be introduced over four years beginning in the fall semester 1997 (appendix 3). Approximately 50 students would be enrolled in 1997-3. Subsequently an additional 50 students will be added each year. The total undergraduate enrollment in the School of Resource and Environmental Management at full development will be 200. The transdisciplinary courses, which are designed to accommodate the needs of the entire university community, will be offered at least twice annually.

Sequence of Adding Faculty

To fulfill its responsibilities with regards to the undergraduate program in Bachelor of Resource and Environmental Management (BREM), REM will require 6 new faculty members. The existing REM faculty members carry a full course load within the existing REM graduate program. The existing REM faculty will be involved in the undergraduate program as each faculty member is expected to teach one or two undergraduate courses. New faculty members will be involved in the REM graduate program as each new faculty member is expected to teach one or two courses at the graduate level and supervise graduate students. New and existing faculty members will be provided with equal opportunities to teach at the graduate and undergraduate level subject to the course requirements constraint of the graduate and undergraduate programs. New and existing faculty members are expected to carry an equal student supervisory load at the graduate and undergraduate level. New faculty will be hired over a 4-year period. Two new REM faculty members will be needed in 1997-1998 and two in each of 1999-2000 and 2000-2001 (appendix 3).

Sequence of Adding Support Staff

The staff required to present the new undergraduate program will be added over a four-year period. An undergraduate program coordinator is required in 1997-2. One-half technician is needed in 1997-3, and an additional technician in 1998-3 (appendix 3).

III. BUDGET

Over a four-year period, 1997-2001, a gradual increase in REM's budget will be required to fund the proposed program. The budget for the proposed program will amount to \$357,450 in year one, \$293,250 in year two, \$738,000 in year three, and \$716,250 in the final year and subsequent years if the full proposal is implemented over a four-year period (appendix 4). These figures include operating capital, laboratory, and field costs (appendix 5). REM does not have a designated co-op coordinator and all co-op work is currently being handled by the Graduate Administrator. The university's co-op program will fund 1 co-op position (\$45,000) plus administrative costs of \$10,000 each year.

IV. SPACE

Four types of laboratory space are required for the REM program. These are:

- a natural resource laboratory
- a computer lab
- a GIS lab
- a project room

Tutorial rooms are adequate for the remainder. These rooms will be required between 1997-1998 and 2000-2001 (Appendix 6).

V. EXTERNAL EVALUATION OF THE PROPOSED BREM PROGRAM

Response to the proposed program has been strong from the BC. Ministry of Environment. Two assistant deputy ministers (O'Riordan and Thompson) verified that in the future, the kinds of managers SFU proposes to educate will be in demand. They have offered to help with the design of the program (appendix 6).

A subcommittee of the SFU Co-op Advisory Committee evaluated the proposed BREM program in terms of its utility to society in general and the private sector in particular. Its report is also included in appendix 4. The committee members represented the perspectives of the banking, forest products, and environmental consulting industries. It concluded that:

"the ENPL program is timely and contains studies which are desired by many industries. Different industries may seek specialization in their area of interest, but all agree that a broad approach has considerable merit. We encourage . . . (REM) . . . to pursue the implementation of (this) program."

A Ph.D staff member of a consulting firm who reviewed the proposal commented:

"Looks like an excellent program with a good blend of theoretical and practical courses, . . . If I was a starting undergraduate student, I would want to enroll".

At the same time the committee highlighted several potential deficiencies in the program design. These included: the provision of solid writing abilities, exposure to marketing concepts for small business; specific coverage of international environmental and resource management topics and concepts of working together in interdisciplinary, intercompany, interinstitutional, interracial, and intercultural forums. Some of these issues, such as working in an intercompany, and inter institutional environment are difficult to achieve in a university setting and are best experienced in the work place. Attention to writing skills has been added to the REM program by adding courses ENGL 101 and ENGL 199. In addition, 3 to 6 optional credits are available to students to take extra courses in writing. Also, we have added a course GEOG 450 to provide students with "group working skills". This course will strengthen the ability of students to work together in an interdisciplinary, interracial and intercultural environment. Furthermore, an advisory committee to the School of Resource and Environmental Management will be established. Composed of both private and public sector experts, it will be used to give policy advice and ensure the relevance of the curriculum to emerging social needs.

There were two other potential deficiencies which are more difficult to remedy or address immediately. The first one is a provision of a requirement or a possible option for a graduating thesis. This will be difficult because the program is designed with a minimal level of faculty. Indeed, we will not have sufficient personnel to do this for many years, if ever. The second problem relates to the assurance that the BREM degree will form a strong basis for a number of postgraduate degree programs. This has been corrected by adding two courses. The REM 404-3 course, which will be open to all students, provides exposure to a broad range of research methodologies and analytical techniques. In addition, honors students will be required to enroll in directed studies in an advanced topics course (REM 464-4) to permit the development of greater depth and breadth in a selected area.

The REM faculty fully expects that BREM students will be competitive in graduate education based on the high quality of students who have been attracted to the master's program in the past, and the diversity, depth, and practical orientation of the proposed undergraduate curriculum. For example, all of our master's graduates have been successful in entering the PhD programs of their choice. However, only time will tell how well BREM graduates will do at the master's level.

Finally there is a question of employability of BREM graduates. In light of the large and growing number of employment opportunities in the resource and environmental area, and the universal success of master's graduates from REM in gaining employment in their field of study, we expect that BREM graduates will be competitive for a broad spectrum of jobs in society.

Appendix 1

**Calendar Description of the BREM Program:
Bachelor of Resource and Environmental Management**

**School of Resource and Environmental Management (REM)
Faculty of Applied Sciences
Bachelor of Resource and Environmental Management
(BREM)**

Location: 9683 Shrum Classroom Building
Telephone: 291-4659/291-3074
Director: Dr. Frank Gobas

Professors:

J. Chadwick Day BSc (Geology), MSc (Geography, Univ. of Western Ontario), PhD (Resource Geography, Univ. of Chicago), Director, School of Resource and Environmental Management
Jack L. Knetsch BS. (Soil Science, Michigan State), MS. (Agric. Econ., Michigan State), MPA (Pub. Admin, Harvard University), PhD (Econ., Harvard University) Professor, School of Resource and Environmental Management and the Department of Economics
Randall M. Peterman BSc (Biological Sciences, Univ. of California at Davis), PhD (Zoology, Univ. of British Columbia)

Associate Professors:

Alison Gill BA. (Geography, Hull Univ.), M.A. (Geography, Univ. of Alberta), PhD (Geography, Univ. of Manitoba), School of Resource and Environmental Management and Department of Geography
Frank Gobas BSc (Chemistry, Free Univ. of Amsterdam), MSc (Environ. Chem. & Toxicology, Univ. of Amsterdam), PhD (Chemical Eng., Univ. of Toronto)
Thomas I. Gunton BA. (Univ. of Waterloo), M.A. (Urban and Regional Planning, Univ. of Waterloo), PhD (Community and Regional Planning, Univ. of British Columbia)
Mark Jaccard BA. (Economics/Geography, Simon Fraser University), MRM (Resource Management, Simon Fraser University), PhD (Economics, Grenoble)
Kenneth Lertzman BSc (Zoology, Univ. of Manitoba), MSc (Zoology, Univ. of British Columbia), PhD (Zoology, Univ. of British Columbia)
Peter W. Williams BA. (Geography, Univ. of Ottawa), M.A. (Geography, Univ. of Waterloo), PhD (Tourism and Outdoor Recreation, Utah State) Director, Centre for Tourism Policy and Research

Assistant Professors

Pamela Wright BS. (Natural Science, Lakehead University), HBOR. (Outdoor Recreation, Lakehead University), MS. (Natural Resource Interpretation, Ohio State University), PhD (Natural Resources Communications and Marketing, Ohio State University)

Associated Faculty

J.H. Borden BSc (Washington State), MSc, PhD (California) Professor, Department of Biological Sciences
Parzival Copes BA., M.A. (British Columbia), PhD D.Mil. Sc. (Royal Rhodes) Professor Emeritus, Department of Economics,
Edward M. Gibson BA., M.A. (Western Ontario), PhD (British Columbia) Department of Geography
Alton Harestad BSc, M.A., PhD. D. (British Columbia) Associate Professor, Department of Biological Sciences
Dan Moore BSc (British Columbia), PhD (Canterbury) Geography,
John Pierce BA. (Toronto), M.A. (Waterloo), PhD (London) Department of Geography
John Richards BA. (Saskatchewan), M.A., PhD (Washington University, St. Louis). Faculty of Business Administration
Arthur Roberts BA. (Toronto), M.A. (Waterloo), PhD (York) Department of Geography
Michael C. Roberts BSc (London), M.A. (Toronto), PhD (Iowa), FRGS. Department of Geography
Richard Routledge BSc (Queens), MSc (Alberta), PhD (Dalhousie) Department of Mathematics
Margaret G. Schmidt BSc (Guelph), MSc (Lakehead), PhD (British Columbia) Professor, Department of Geography

Limited Term Appointments

Bob Newbury BSc (Manitoba), MSc (Manitoba), PhD (Johns Hopkins), Professor

Adjunct Professors

- Mary Barker** *BSc (London), M.A. (Toronto), PhD (Toronto)* Faculty Associate, Fachrichtung Geographie, Universitat des Saarlandes, Saarbrucken, Germany
- Warren Bell** *BA. (Victoria), M.A. (Western)* Director of Energy Management, BC Ministry of Energy, Mines and Petroleum Resources, Victoria, BC
- Michael Henderson** *BSc (Western), MSc (Manitoba), PhD (British Columbia)* Research Scientist, Canadian Department of Fisheries and Oceans, Vancouver, BC
- Richard Hoos** *BSc (Calgary), MSc (Victoria)* Director, Northern Affairs, Polar Gas, Calgary, AB
- A. John Jordan** *BA. (Hartwick College, NY), PhD (Maine)* Manager, Environmental Services, Vancouver Port Corporation, Vancouver, BC
- Michael J. Kent** *BA. (SFU), MSc (Alberta)* Director, Highway Environment, Ministry of Transportation and Highways, Victoria, BC
- Michael Margolick** *BA. (Cornell), PhD (British Columbia)* BC Energy Council, Vancouver, BC
- David Marmorek** *BES (Waterloo), MSc (British Columbia)* Director and Partner, Environmental and Social Systems Analysts Ltd. (ESSA), Vancouver, BC
- David Marshall** *BSc (Queen's University)* Program Director, Fraser Basin Management Program, Vancouver, BC
- Andrew MacKinnon** *BSc (British Columbia), MSc (British Columbia)* Manager Forest Ecology, BC Ministry of Forests, Research Branch, Victoria, BC
- Denis O'Gorman** *BA. (Alberta), M.A. (British Columbia)* Deputy Commissioner, Commission on Resources and Environment, Victoria, BC
- Jonathan O'Riordan** *BA. (Edinburgh), M.A., PhD (British Columbia)* Assistant Deputy Minister, Ministry of Environment, Victoria, BC
- Ken Peterson** *BA. (UBC), M.A. (Northwestern)* Energy Planning Consultant, Vancouver, BC
- Raymond Robinson** *BA. (British Columbia)* Deputy Chairman, Federal Environmental Assessment Review Office (FEARO), Vancouver, BC
- Bruce Switzer** *B. Phys Ed (Alberta), MSc (Alberta), PhD (Alberta)* President, Switzer and Associates Consulting, Delta, BC
- Andrew R. Thompson** *LLB. (Manitoba), LL.M. (Toronto), JSD (Columbia)* Professor, University of British Columbia, Vancouver Associate Counsel, Ferguson Gifford, Vancouver, BC

Bachelor of Resource and Environmental Management

The School of Resource and Environmental Management offers programs leading to majors and honors BREM degrees in Resource and Environmental Management. Our mission is to improve methods for attaining sustainable resource and environmental practices by advancing, applying, and disseminating relevant knowledge and expertise to meet that objective.

To achieve this mission, we strive for excellence in teaching, research, and service programs focusing on the understanding and management of:

- the dynamics of natural resources
- strategies and techniques of sustainable natural resource and environmental planning, management, and policy formulation
- the biological, physical, social, economic, and institutional impacts of resource decisions, and
- the efficiency and effectiveness of institutional arrangements affecting resource management decisions

To achieve these goals we actively encourage and undertake:

- interdisciplinary teaching and development programming on natural resource and environmental issues of local, national, and international interest
- research programs which integrate the combined natural, social, and applied science capabilities of our faculty members and those from related disciplines
- educational programs which promote the development of critical thinking, theoretical and practical problem solving, communication, and management skills.

UNDERGRADUATE TEACHING

We offer an interdisciplinary undergraduate program in resource and environmental management. Group learning and collaborative management skills are emphasized throughout the program. Graduates will be prepared to: meet society's needs for specialists in sustainable resource and environmental planning and management; gain appropriate employment in a variety of fields; apply a diverse body of relevant knowledge in formulating solutions to existing and emerging problems; and continue their education in a wide variety of related disciplines. In the delivery of this program we will use advanced technology in support of a variety of classroom, laboratory, and distance education techniques.

Academic Advising

Each student majoring in Resource and Environmental Management must contact an advisor in the School of Resource and Environmental Management before registration.

Admission

The School of Resource and Environmental Management has a direct entry admission program. Entry to the Bachelor of Resource and Environmental Management is possible via:

- a) Direct admission from high school for students who have completed Biology 12, Chemistry 12, Mathematics 12 and Physics 12 (or equivalents) OR
- b) Internal transfer from within Simon Fraser University for students who have completed all the lower division requirements OR
- c) Transfer from a recognized post-secondary institution for students who meet lower division requirements.

Cooperative Education

Students in the School of Resource and Environmental Management may take part in a cooperative education program. This results in a combination of work in a governmental, industrial, consultant, or academic research setting. Intensive specialized study is coupled with a project under the direction of a practicing professional or academic.

The cooperative education program may consist of up to four semesters of practical experience in an appropriate setting leading to a project under the technical direction of a practicing professional scientist or manager. The internship may take place within the university but in most cases the work site will be remote from the university. A member of the external organization and a faculty member from the school jointly supervise each project. Arrangements for the work semesters are made through the University's Office of Co-op Education. For further details, students should refer to the *Cooperative Education* section of the calendar.

BREM Program

Students who study in this field will develop interdisciplinary skills drawn from the sciences, arts, and management fields related to sustainable environmental planning and management. The program is demanding and is aimed at students with a high grade point average. The program is structured so that completion is possible in four years (eight semesters) of full time study at Simon Fraser University with up to an additional four semesters of cooperative work. Computers receive major emphasis as tools for learning, conceptualization, design, and analysis. Group problem solving is emphasized throughout the program.

Appendix 1B

MEMO FROM DEPARTMENT OF GEOGRAPHY
GEOG 445 PREREQUISITES

06/05/95 11:52 SFU GEOGRAPHY → 604 231 4700

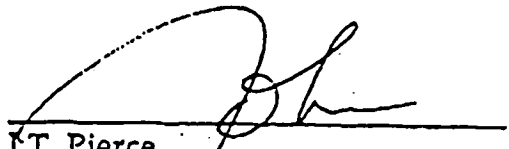
SIMON FRASER UNIVERSITY
Department of Geography
M E M O R A N D U M

TO: Chad Day FROM: J.T. Pierce
SUBJECT: Geog. 445, ENPL Prerequisites for Geog 450. DATE: Jan. 11, 1995

Geog 389,

This is to inform you that I will be making changes to the prerequisite structure for Geog. 445 to accommodate students in ENPL. Students in the ENPL programme, and all other students from any faculty at Simon Fraser University, will not be required to take Geog. 322 or 385. Instead they must complete ENPL 100, 200, and one of 311, 316 or 356.

389: Home Ecology
450: Workshops


J.T. Pierce
Professor and Chair

jtp:eds

Appendix 2

**Proposed New Resource and Environmental Management
Courses and Course Proposal Forms**

- REM 303-3 Introduction to Planning Thought
- REM 311-3 Applied Ecology and Sustainable Environments
- REM 313-3 Fisheries Management: An Introduction
- REM 320-3 Introduction to Natural Resource Dynamics, Analysis, and Management
- REM 330-3 Applications of Geographic Information Systems in Resource and Environmental Management
- REM 331-3 Applied Watershed Hydrology
- REM 340-3 Environmental Conflict and Public Involvement in Decision Making
- REM 341-3 Environmental and Resource Law
- REM 342-3 Principles of Sustainable Environmental Planning and Management
- REM 343-3 Decision Making in Resource and Environmental Management
- REM 346-3 Impact Assessment
- REM 347-3 Planning and Management of Protected Areas
- REM 350-3 Energy Planning and Management
- REM 356-3 Institutional Arrangements for Sustainable Environmental Management
- REM 360-3 Special Topics in Resource and Environmental Management
- REM 404-3 Methods and Tools for Resource Planning and Management
- REM 410-3 Environmental Quality Assessment and Management
- REM 412-3 Environmental Modeling
- REM 420-3 Advanced Dynamics, Analysis, and Management of Natural Resources
- REM 445-3 Environmental Risk Assessment and Management of Hazardous Substances
- REM 446-3 Resource and Environmental Management for First Nations
- REM 448-3 Tourism Planning and Management
- REM 455-3 Water Planning and Management
- REM 460-3 Special Topics in Resource and Environmental Management
- REM 464-4 Directed Study in Advanced Resource and Environmental Planning Topics

REM 471-3 Forest Ecosystem Management

REM 475-3 Freshwater Ecosystem Management

REM 477-3 Applied Conservation Biology

Cooperative Education Courses

REM 390-0 Practicum I

REM 391-0 Practicum II

REM 490-0 Practicum III

REM 491-0 Practicum IV

(BREM 9 May 1996)

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 303 Credit Hours: 3 Vector: 2-1-0

Title of Course: INTRODUCTION TO PLANNING THOUGHT

Calendar Description of Course: An overview of two centuries of planning history and thought, this course introduces the four major planning traditions: social reform, policy analysis, social learning, and social mobilization. It explores the role of the planner in each of these traditions, and offers contemporary perspectives on the present and future of the planning profession.

Nature of Course: Lecture, tutorial

Prerequisites (or special instructions): REM 100, 200

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? at least annually

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?

None - new faculty needed.

3. Objectives of the course (rationale) This course introduces students to the intellectual traditions of planning with an emphasis on the relationship between knowledge and action. It focuses on the major traditions of planning thought and practice, and develops in students a foundation for understanding the social sciences and public policy.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year:	See attached schedule for new faculty and staff
Staff for third year:	See attached schedule for new faculty and staff
Library:	Modest: potentially a few new volumes, reserve readings
Audio Visual:	Slide, overhead, and video projectors
Space:	Lecture and tutorial rooms
Equipment:	None

5. Approval

Date: May 11, 1996

May 11, 1996

Parveen Bawe


Department Chair

Dean

Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 303-3

Introduction to Planning Thought

This course will introduce students to the intellectual traditions of planning – the relation between knowledge and action. It will focus on the major traditions of planning thought and practice, and develop a foundation for understanding the social sciences and public policy. An overview of two centuries of planning history and thought, this course introduces the four major planning traditions of social reform, policy analysis, social learning, and social mobilization. It explores the role of the planner in each of these traditions, and offers contemporary perspectives on the present and future of the planning profession.

Grading Distribution

Book Review	20%	Mid-term	20%
Term Paper	40%	Class Participation	20%

Lecture Topics

- A The Terrain of Planning
- B An Overview of Planning Theory
 - 1. Planning in Market Societies
 - 2. The Uses of Planning
- C Planning as Social Reform
 - 1. Planning as a Form of Scientific Management
 - 2. Rational-Comprehensive Planning and the Systems Approach
- D Planning as Policy Analysis
 - 1. The Profession of Policy Analysis
- E Planning as Social Learning
- F Planning as Social Mobilization
 - 1. Advocacy Planning and Citizen Participation
- G Emergents in Planning Theory
 - 1. Devolution, Decentralism, and Self-Management

References

Friedmann, J. 1987. *Planning in the Public Domain*. Princeton, NJ: Princeton University Press.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information School: School of Resource and Environmental Management

Abbreviation Code: REM New Course No: 311 Credit Hours: 3 Vector: 2-0-2

Title of Course: **APPLIED ECOLOGY AND SUSTAINABLE ENVIRONMENTS**

Calendar description of Course: Students will learn to apply the ecological concepts introduced in prerequisite courses to applied ecological problems at the population, community, and ecosystem levels of organization. Emphasis will be placed on processes which drive ecological dynamics, on recognizing those processes and dynamics in applied contexts, and on interpreting ecological data.

Nature of Course: Lecture/Tutorial-Computer Lab

Prerequisites (or special instructions): REM 100, REM 200, BISC 204, STAT 101 or equivalent,
MATH 154 or equivalent

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?

None. New faculty required.

3. Objectives of the Course (rationale) This course will build on, and integrate, the previous courses on ecological systems and quantitative methods by examining the nature of applied ecological problems and data. This will provide the conceptual framework required for subsequent advanced courses in applied ecology and its role in sustainable environmental management (e.g. REM 412-4, REM 413-4, REM 471-4).

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: Modest. complements requirements for REM graduate program. 2-3
Journal subscriptions and a few volumes.

Audio Visual: Slide and overhead projectors

Space: Lecture and tutorial rooms and computer lab

Equipment: Computer laboratory for 50 students

5. Approval

Date:

May 11, 1996

May 11, 1996

Department Chair

Dean

Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 311-3

APPLIED ECOLOGY AND SUSTAINABLE ENVIRONMENTS

This course has four objectives. It helps students:

1. To gain appreciation of the processes driving the structure and dynamic behavior of ecological systems.
2. To learn to interpret the types of data generally available on applied ecological problems.
3. To apply ecological concepts to analyzing actions taken in management and conservation of populations, communities and ecosystem; and
4. To learn the relevance of ecological processes to problems of resource management, conservation and environmental monitoring and assessment.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

LECTURE TOPICS

- A. Objectives of course, introduction to applied ecology:
What is the scope and mandate of applied ecological science?
- B. Hierarchical systems
 1. patterns of connectedness in ecological systems
 2. variable interaction strengths
- C. Interrelation of theoretical, experimental and applied ecology
 1. Basic tools for management of biological resources
 2. Paradigms
- D. Population ecology
 1. Single populations: The MSY problem
 2. Intraspecific interactions
 3. Population regulation
 4. The viable population problem
- E. Community ecology
 1. Introduction to applied community ecology: management and conservation
 2. Diversity and biodiversity
 - a. diversity at different levels of the ecological hierarchy
 - b. measuring diversity
 - c. tropical species diversity
 - d. diversity in temperate forests as a management problem
 3. Interspecific interactions 1: management and the predation process
 4. Interspecific interactions 2: management and positive feedbacks among species

5. Dynamics of communities
 - a. changing paradigms of succession & disturbance
 - b. management of non-equilibrium communities
 - c. island biogeography and the design of reserves
 - d. the diversity and stability problem
 - e. stability properties, causes and effects
- F. Ecosystem Ecology
 1. Ecosystems at different spatial and temporal scales
 2. Ecosystems as dynamic systems
 3. Ecosystem responses to disturbances
 - a. stability and feedbacks in local ecosystems
 - b. feedbacks and dynamics of the global ecosystem
 4. Ecosystem Health/Ecological integrity
- G. Landscape ecology and problems at larger/longer spatio-temporal scales
 1. what is landscape ecology?
 2. boundaries and edges
 3. fragmentation
 4. corridors
 5. metapopulations
 6. landscape structure and disturbance histories
 7. palaeoecology and the long-term dynamics of landscapes
 8. spatial and temporal scaling as a central problem of applied ecology
- H. Review of major themes of course

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SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No.: 313 Credit Hours: 3 Vector: 2-1-0

Title of Course: FISHERIES MANAGEMENT: AN INTRODUCTION

Calendar Description of Course: Historical overview of fisheries science and management; major issues in management of freshwater and marine fish populations; fish population dynamics; overview of quantitative methods to estimate fish abundance and optimal management actions; case examples that demonstrate lessons for improving future management of fisheries.

Nature of Course: Lecture and tutorial

Prerequisites (or special instructions): REM 100, 200, 311, STAT 101 or 103 or 301

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? Once per year

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?

Randall M. Peterman

3. Objectives of the Course (rationale) There is currently no course offered at the undergraduate level at SFU that exposes students to the dynamics and management of fishes. Yet sport and commercial harvests of fish populations are among the top 3 sources of economic revenue from natural resources in B.C. Knowledge of fisheries is therefore an important component of training for a student majoring in Resource and Environmental Management.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: None

Audio Visual: None

Space: Lecture and tutorial rooms

Equipment: None

5. Approval

Date:

May 11, 1996May 11, 1996[Signature]
Department Chair[Signature]
Dean[Signature]
Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 313-3

Fisheries Management: An Introduction

Objectives: Students will learn:

1. Historical overview of the practice of fisheries management
2. Major issues in management of freshwater and marine fish populations
3. Basic fish population dynamics
4. Overview of methods for estimating stock abundance and evaluating management options
5. Recommendations for improving future management of fisheries

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Course Outline

- A. Historical overview of the practice of fisheries management
 1. Typical phases of development over time of harvesting effort, fish abundance, catch per unit effort, and amount of regulation
 2. Roles of fisheries management agencies
 3. Case examples of successes and failures in management of fish populations
- B. Major issues in management of freshwater and marine fish populations
 1. "Fishing up" phenomenon
 2. Recruitment overfishing and growth overfishing
 3. Development of appropriate models of fish populations given uncertainty
 4. Changes in, and control of, fishing effort and harvests
 5. Definition of management objectives
 6. Ocean "ranching" or artificial enhancement of fish stocks
 7. "Tragedy of the commons"
- C. Basic fish population dynamics
 1. Density-dependent processes
 2. Life history strategies
 3. Multiple causes of changes in fish abundance: (fishing, biological process, and physical oceanographic processes)
 4. Body size and natural mortality
 5. Indirect indices of abundance
 6. Models of fish population dynamics (surplus production, stock-recruitment, age-structured, or dynamic pool models)
- D. Overview of methods for estimating stock abundance and evaluating management options
 1. Quantitative methods for reconstructing past stock abundances
 2. Quantitative techniques for projecting future stock abundances, given proposed management regulations
 3. Simulation modelling
- E. Recommendations for improving future management of fisheries

Required Text: Pitcher, T.J. and P.J. Hart. 1982. Fisheries Ecology. Avi Publishing Co., Inc., 414 pp. (The authors are currently revising this text and the new edition should be out by the spring of 1995, when this course will first be offered).

Background Reading Material:

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- Wooster, W.S. (ed.) 1988. Fishery Science and Management: Objectives and Limitations. Springer-Verlag, New York. 339 pp.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 320 Credit Hours: 3 Vector: 0-3-0

Title of Course: **INTRODUCTION TO NATURAL RESOURCE DYNAMICS, ANALYSIS, AND MANAGEMENT**

Calendar description of course: This is a synthetic course designed to introduce an integrated approach to understanding the dynamics and management of a range of natural resources. It builds on the foundations in basic and applied ecology provided in previous courses by focusing on the analysis of specific problems in resource analysis and management.

Nature of Course: Library, laboratory or field research

Prerequisites (or special instructions): REM 100, 200

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?

None - new faculty needed.

3. Objectives of the Course (rationale) The course is designed to introduce an integrated approach to understanding the dynamics and management of a range of natural resources

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: None

Audio Visual: None

Space: None

Equipment: None

5. Approval

Date: May 11, 1996 May 11, 1996

[Signature] Parveen Bawa
Department Chair Dean Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 320-3

Introduction to Natural Resource Dynamics, Analysis, and Management

This is a synthetic course designed to introduce an integrated approach to understanding the dynamics and management of a range of natural resources. It builds on the foundations in basic and applied ecology provided in previous courses by focusing on the analysis of specific problems in resource analysis and management.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

A. Introduction

1. Introduction to natural resource dynamics, analysis, and management
 - examples of a variety of resource management problems, methods of analysis, and management solutions
 - definitions
2. Introduction to tools for resource analysis
 - gradient of inferential strength from casual observation through formally designed experiments
 - the roles of models in resource analysis
3. Introduction to tools for resource management
 - direct management of the resource
 - management of the resource users
 - the ecosystem management approach: users, resources and environment as a system
 - the roles of models in resource management
 - introduction to adaptive management

B. Resource Problems

4. Population/species/community management: fisheries case studies
 - stock and recruitment
 - population responses to harvesting
 - managing the aquatic environment as fisheries management
 - analysis of case studies of fisheries management and mismanagement

5. Terrestrial ecosystem management: forestry case studies
 - introduction to stand growth and yield
 - calculation of various rotations (timber, ecological, economic)
 - analysis of the ecological impacts of harvesting systems on soils, wildlife, hydrology, fish
 - introduction to new approaches in forest management
 - analysis of case studies in forest management

6. Aquatic ecosystem management: contaminants
 - simple models of aquatic ecosystems (biological and physical variables)
 - eutrophication
 - biomagnification
 - restoration/remediation
 - analysis of case studies in the management of contaminants in aquatic ecosystems

7. Management for conservation
 - linkages between traditional resource management problems and conservation science
 - conservation as a management issue

8. Conclusion
 - synthesis of lessons learned from the different case studies
 - the role of science in management
 - sufficiency of information and problems of uncertainty
 - adaptive and experimental management revisited

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SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 330 Credit Hours: 3 Vector: 2-0-2

Title of Course: **APPLICATIONS OF GEOGRAPHIC INFORMATION SYSTEMS IN RESOURCE AND ENVIRONMENTAL MANAGEMENT**

Calendar Description of Course: Use of GIS in resource and environmental management: geology, atmospheric sciences, hydrology and water quality, mining, forestry agriculture, parks and lands, environmental and social impact assessment.

Nature of Course: Lecture and laboratories

Prerequisites (or special instructions): REM 100, 200

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?

None - new faculty needed

3. Objectives of the Course (rationale) Geographic information systems have become a standard component of virtually every phase of sustainable resource and environmental management. They offer the potential to bring a diverse body of intelligence and new kinds of analyses to bear in developing solutions to problems and in the formulation of policy alternatives.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: A few volumes

Audio Visual: Slide, overhead projectors

Space: GIS Laboratory, Lecture room

Equipment: GIS Computers and software

5. Approval

Date:

May 11, 1996May 11, 1996[Signature]
Department Chair[Signature]
Dean[Signature]
Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 330-3

**Applications of Geographic Information Systems in
Resource and Environmental Management**

Geographic information systems have become a standard component of virtually every phase of sustainable resource and environmental management. They offer the potential to bring a diverse body of intelligence and new kinds of analyses to bear in developing solutions to problems and in the formulation of policy alternatives.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

LECTURE TOPICS

1. Introduction: The role and limitations of GIS.
2. Operation of the system.
3. Sources of information: what is available, how to access it.
4. The Use of GIS in resource and environmental management:
 - Geology
 - Atmospheric Sciences
 - Hydrology and water quality
 - Mining
 - Forestry
 - Agriculture, parks, and lands
 - Urban and regional planning
 - Environmental and social impact assessment

References

Goodchild, Michael F. et al. 199?. *National Center for Geographic Information and Analysis Core Curriculum*. Santa Barbara, CA: University of California, Santa Barbara, Department of Geography.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 331 Credit Hours: 3 Vector: 2-0-2

Title of Course: APPLIED WATERSHED HYDROLOGY

Calendar description of course: The course applies the fundamental concepts of geomorphology and hydrology to the analysis of watershed patterns and stream behaviour with a view to contrasting natural and impacted systems.

Nature of Course: Lectures and field trips to local watersheds and stream reaches

Prerequisites (or special instructions): REM 100, 200

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? Annually, summer or fall semester

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?

Dr. Bob Newbury

3. Objectives of the Course (rationale) The objective is to familiarize students with the basic tools of watershed analysis that are used for environmental assessments, project planning, and the interpretation of forest and fisheries codes.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: Modest: potentially a few new volumes, reserve readings

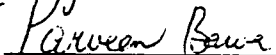
Audio Visual: Slide, overhead, and video projectors

Space: Lecture and laboratory rooms

Equipment: Rental vehicles for field trips

5. Approval

Date:

May 11, 1996May 11, 1996

Department Chair

Dean

Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 331-3

Applied Watershed Hydrology

Objective

The objective is to familiarize students with the basic tools of watershed analysis that are used for environmental assessments, project planning, and the interpretation of forest and fisheries codes.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Course Content

The course applies the fundamental concepts of geomorphology and hydrology to the analysis of watershed patterns and stream behaviour with a view to contrasting natural and impacted systems.

1. Methods for analyzing streams and watershed rehabilitation schemes
2. Examples of the impact of various scales of development projects on rivers, reservoirs and urban streams.

The course will be composed of lectures and field trips to local watersheds and stream reaches.

Readings:

Stream hydrology and rehabilitation

Munro, K. and G. Taccogna. 1994. The Streamkeepers Handbook. Vancouver, B.C.: Department of Fisheries and Oceans.

Newbury, R. and M. Gaboury. 1993. Stream Analysis and Fish Habitat Design, NHL.

General Methods

Dunne, T. and L. Leopold. 1978. Water in Environmental Planning. Freeman.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 340 Credit Hours: 3 Vector: 2-1-0

Title of Course: ENVIRONMENTAL CONFLICT AND PUBLIC INVOLVEMENT IN DECISION MAKING

Calendar description of course: This course is designed to assist students in understanding the nature of environmental conflict and the role of the public in resolving environmental disputes. Specifically, the course will examine theoretical aspects of conflict, public participation, and dispute resolution in natural resource management and will be practically oriented such that students develop skills in determining: when alternative dispute resolution is appropriate; designing a process for dispute resolution; evaluating the success of the process; and participating in the process.

Nature of Course: Lecture, tutorial

Prerequisites (or special instructions): REM 100, 200

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? Annually

Semester in which the course will first be offered? 1997-1

Which of your present faculty would be available to make the proposed offering possible?

None - new faculty needed

3. Objectives of the Course (rationale) This course will: analyze the theoretical basis of natural resource conflicts; examine the role of a range of public participation and dispute resolution techniques within the larger framework of shared decision-making, consensus building techniques, and multi-stakeholder working groups; identify the appropriate application of public participation and dispute resolution techniques; design a process for public involvement in decision making; develop a framework for evaluating the success of public participation and dispute resolution efforts.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: Already sufficient

Audio Visual: Slide, overhead, and video projectors

Space: Lecture and tutorial rooms

Equipment: None

5. Approval

Date:

May 11, 1996May 11, 1996[Signature]
Department Chair[Signature]
Dean[Signature]
Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 340-3

Environmental Conflict and Public Involvement in Decision Making

Description

This course is designed to assist students in understanding the nature of environmental conflict and the role of techniques in resolving environmental disputes. Specifically, the will examine theoretical aspects of conflict, public participation, and dispute resolution in natural resource management and will be practically oriented such that students develop skills in determining: when alternative dispute resolution is appropriate; designing a process for dispute resolution; evaluating the success of the process; and participating in the process.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Objectives

Upon successful completion of the course the student will be able to:

- analyze the theoretical basis of natural resource conflicts
- examine the role of a range of public participation and dispute resolution techniques within the larger framework of shared decision-making, consensus building techniques, and multi-stakeholder working groups
- identify the appropriate application of public participation and dispute resolution techniques
- design a process for public involvement in decision making
- develop a framework for evaluating the success of public participation and dispute resolution efforts

Format

The format of the class will consist of three main parts: discussion of readings, skills practicums, and application of theory and skills to actual cases. Roughly one-third of class time will be used in skills practicums. A number of guest speakers will provide insight into specific environmental disputes in B.C. as well as discuss the incorporation of alternative dispute resolution with other resource management practices and processes.

Assumptions

Since this course addresses the topic of public participation and shared decision-making, you will be expected to play an active role in decision-making (under the framework of the course objectives) about course progress, activities, and evaluation. Class participants will be responsible for making consensus recommendations to the course instructor.

Additionally, as this class is designed to have a substantial practical skill component and since the recognized way of developing these skills is through role playing -- students will be expected to be active and interested participants in these processes.

References

Fisher, Roger and William Ury. 1991. Getting to Yes: Negotiating Agreement Without Giving In. New York, NY.: Penguin Books.

Susskind, Laurence and Jeffrey Cruikshank. 1987. Breaking the impasse: Consensus approaches to resolving public disputes. New York, NY: Basic Books.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 341 Credit Hours: 3 Vector: 2-1-0

Title of Course: ENVIRONMENTAL AND RESOURCE LAW

Calendar description of course: This course has been designed as a practical introduction to the legal system that applies to resource and environmental issues in Canada. It will acquaint students with basic legal principles and a broad body of law from fisheries to constitutional law. The course will examine the intellectual tools of legal reasoning and the ways in which lawyers approach environmental problems. Students will also gain an understanding of legal instruments through which environmental policy is implemented and enforced. These include statutes, regulations and judicial decisions. This will assist students in analyzing institutional structures and legal processes, and in preparing for personal involvement in court cases, administrative hearings and other legal and quasi legal processes.

Nature of Course: Lecture, tutorial

Prerequisites (or special instructions): REM 100, 200

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? Annually

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?
None - new faculty needed.

3. Objectives of the Course (rationale) Students will learn about the legal underpinnings of the current system of resource and environmental management in Canada and British Columbia. Existing constraints and desirable institutional changes will be stressed.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: Already sufficient

Audio Visual: Slide, overhead, and video projectors

Space: Lecture and tutorial rooms

Equipment: None

5. Approval

Date:

May 11, 1996May 11, 1996[Signature]
Department Chair[Signature]
DeanParveen Bawa
Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 341-3

Environmental and Resource Law

This course is a practical introduction to the legal system that governs resource and environmental issues in Canada. It acquaints students with basic legal principles and a broad body of law. The course examines the intellectual tools of "legal reasoning" and the ways in which lawyers approach environmental problems. Students also gain an understanding of legal instruments through which environmental policy is implemented and enforced statutes, regulations and judicial decisions. The course assists students in analyzing institutional structures and legal processes, and in preparing for personal involvement in court cases, administrative hearings, and other legal and quasi-legal processes.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Lecture Topics

- A. The first portion of the course covers the following basic areas of law affecting resource and environmental issues:
1. Introduction to the Canadian legal system
 2. Basic concepts in legal proceedings
 3. The court system and legal research
 4. Administrative law, public hearings and enquiries
 5. Constitutional law and resource Jurisdictions: water management
 6. International law: The Law of the Sea (Fisheries)
 7. Environmental law
 8. Land use law and Institutional arrangements
 9. Aboriginal rights and land claims
 10. Evidence and expert witnesses

- B. The second part of the course consists of a number of workshops on specific areas of environmental and natural resources law. The objectives of each workshops will be:
1. To elucidate the basic character of a specific resource area not covered above, such as forestry, mining, impact assessment, or land use planning; and
 2. To present a case study of a legal problem within the selected resource area, in light of legal issues raised in the course.

References

Hughes, Lucas and Tilleman. 1993. Environmental Law and Policy. Toronto, ON: Emond Montgomery Publications.

The Continuing Legal Education Society of British Columbia. 1991. Environmental law and Practice--1991. Vancouver, B.C.: The Continuing Legal Education Society of British Columbia.

The Canadian Institute. 1990. Western Canadian Environmental Law and Regulation: A Comprehensive Two-Day Course. Toronto, ON: The Canadian Institute.

Tingly, D. 1987. Environmental protection and the Canadian Constitution. Edmonton, AB: Environmental Law Centre.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 342 Credit Hours: 3 Vector: 2-1-0

Title of Course: **PRINCIPLES OF SUSTAINABLE ENVIRONMENTAL PLANNING AND MANAGEMENT**

Calendar Description of Course: An examination of planning theory, methods, and applications to resource and environmental management challenges. Concepts of sustainability and sustainable development are clarified, and planning techniques for operationalizing sustainability in a variety of management contexts are explored.

Nature of Course: Lecture, tutorial

Prerequisites (or special instructions): REM 100, 200

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1997-3

Which of your present faculty would be available to make the proposed offering possible?
None - new faculty needed.

3. Objectives of the course (rationale) This course will introduce students to the intellectual traditions and analytical techniques of environmental planning. Sustainability planning is the most versatile, comprehensive and contemporary approach to the discipline of environmental planning.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty:	See attached schedule for faculty and staff
Staff:	See attached schedule for faculty and staff
Library:	modest: potentially a few new volumes and reserve readings
Audio Visual:	slide, overhead, and video projectors
Space:	lecture and tutorial rooms
Equipment:	none

5. Approval

Date: May 11, 1996

May 11, 1996

Parveen Bawa

Department Chair

Dean

Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 342-3

Principles of Sustainable Environmental Planning and Management

This course will introduce students to the intellectual traditions and analytical techniques of environmental planning. Sustainability planning is the most versatile, comprehensive and contemporary approach to the discipline of environmental planning. We will examine planning theory, methods and applications for resource and environmental management challenges. Concepts of sustainability and sustainable development will be clarified; and planning techniques for operationalizing sustainability in a variety of management contexts will be explored.

Grading Distribution

Book Review	20%	Mid-term	20%
Term Paper	40%	Class Participation	20%

Lecture Topics

- A Planning and development theory
- B Sustainable development and natural resources
- C Sustainability: protecting the Future
- D Making sustainability operational: the meaning of "environmental capacity"
- E Sustainability planning
- F Instruments of environmental protection
- G Regulations versus financial Incentives
- H The role of government expenditure
- I Integrating social and environmental policy
- J Global environmental economic policy
- K Making environmental decisions
- L Measuring success

Reference:

Jacobs, M., *The Green Economy: Environment, Sustainable Development and the Politics of the Future* (London: Pluto Press, 1991).

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 343 Credit Hours: 3 Vector: 2-1-0

Title of Course: **DECISION MAKING IN RESOURCE AND ENVIRONMENTAL MANAGEMENT**

Calendar description of course: Successful resource and environmental management requires two kinds of theory; substantive theory which deals with the specific nature of a particular policy field such as forestry or fisheries and procedural theory which deals with the process of decision making in general.

Nature of Course: Lecture, tutorial

Prerequisites (or special instructions): REM 100, 200, 311, and 356

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?

Dr. Tom Gunton

3. Objectives of the Course (rationale) The purpose of this course is to acquaint students with the procedural theory of rational decision making. The course will attempt to illustrate both how policy ought to be formulated as well as how it is actually formulated in the real world.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: Adequate

Audio Visual: Adequate

Space: Lecture and tutorial rooms

Equipment: None

5. Approval

Date: May 11, 1996 May 11, 1996

[Signature] [Signature]

Department Chair Dean Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 343-3

Decision Making in Resource and Environmental Management

Successful resource and environmental management requires two kinds of theory; substantive theory which deals with the specific nature of a particular policy field such as forestry or fisheries, and procedural theory which deals with the process of decision making in general.

The purpose of this course is to acquaint students with the procedural theory of rational decision making. The course will attempt to illustrate both how policy ought to be formulated as well as how it is actually formulated in the real world.

COURSE FORMAT AND ORGANIZATION

The course will meet once per week. Each weekly session will be organized around assigned readings. The session will be joint lecture/discussion. The final weeks will be devoted to student presentations of their own policy papers.

Student Evaluation

	% of mark
1. Complete weekly readings, engage in class discussions and workshops.	20
2. Prepare review of the following book: <u>Our Common Future</u>	20
3. Prepare and present to the class a paper analyzing the policy-making process in a policy field of interest to the student.	60
i) presentation	20
ii) first draft	20
iii) final draft	20

To ensure fair comparisons among students, and to be consistent with university policy, deferred grades are given only under extreme and exceptional circumstances such as illness or death in the family. A heavy workload is not a sufficient justification for a deferred grade. There are no exceptions to this policy. Students should schedule the writing of papers to spread the workload more evenly throughout a semester.

Lecture Topics

1. The Decision Making Process

Readings:

D. Weimer and A. Vining, Policy Analysis, (Englewood Cliffs: Prentice Hall, 1989) Chapter 6.

Frank Harrison, The Managerial Decision-Making Process, pp 22-28.

E. Stokey and R. Zeckhauser, A Primer for Policy Analysis , Chapter 14.

John Friedman and Barclay Hudson, "Knowledge and Action: A Guide to Planning Theory, JAIP Vol. 40 (Jan. 1974), pp 2-15.

2. Techniques for Decision Making

a) Program Scheduling (PERT and CPM).

Readings:

D. Kruekeberg and A. Silvers, "Program Scheduling," Urban Planning Analysis, pp. 231-250.

b) Projection Techniques (Extrapolation, Delphi, Scenario Writing)

Readings:

G. Chadwick, "Projecting the System," A Systems View of Planning, pp. 155-186.

I. Miles and J. Irvine "Social Forecasting: Predicting the Future or Making History" in J. Irvine, I. Miles and J. Evans ed., Demystifying Social Statistics, pp. 305-325.

c) Evaluation Techniques (Cost-benefit, Cost-effectiveness, Goals Achievement Matrix, Linear Programming, Decision Trees).

Readings:

E. Stokey and R. Zeckhauser, A Primer for Policy Analysis, Chapter 12.

D. Kruekeberg and A. Silvers, Urban Planning Analysis, pp. 193-226.

Donald McAllister, Evaluation in Environmental Planning, Chapters 6, 7, 8, 9, 13.

A. Thompson, "West Coast Oil Port," in T. Dorsey ed., Coastal Resources in the Future of British Columbia.

d) Implementation Strategies

Weimer and Vining, pp. 125-173, 305-315.

D. A. Mazmanian and P.A. Sabatier ed., "The Implementation of Public Policy," Effective Policy Implementation, pp. 3-37.

e) Negotiation Techniques

A. Dorcey, "Negotiation in the Integration of Environmental and Economic Assessment for Sustainable Development."

J. Lilley, "Resolving Conflict: A Case Study".

P. Begin, "Mechanisms that Involve Community Participation in the Settlement of Environmental Disputes."

3. Impediments to Rational Decision Making

Readings:

D. Weimer and A. Vining, Policy Analysis, Chapter 4.

4. Role of Public and Institutions in Decision Making

a) I. Fox "Institutions for Water Management in a Changing World." Natural Resources Journal, 16 (Oct. 1976), 743-758.

b) D. MacAllister, Evaluation in Environmental Planning, Chapt. 13.

5. Case Studies in Decision Making.

Term Project

For the term project you are expected to prepare a policy background paper suitable for a cabinet discussion. You will be asked to present your paper to a simulated cabinet meeting. Prior to the meeting you will provide the cabinet with copies of a draft of your policy paper. One person will be designated to provide a formal review of your paper.

Although each policy paper will vary depending on the issue, it should include the following components:

- 1) Problem Definition
 - i) short summary of the problem or issue
- 2) Background and Origin of Problem
- 3) Existing Policies and Institutional Mechanisms Relevant to Problem

- 4) Interest Groups
 - i) aspirations
 - ii) power
 - iii) background
 - iv) previous behaviour
- 5) Alternatives
 - i) identify feasible options
 - ii) evaluate options
- 6) Recommendations
 - i) additional analysis required
 - ii) actions required
- 7) Postscript
 - i) Indicate how you think this issue will be resolved and why
- 8) A short executive summary

After the presentation of the draft paper to class (the cabinet) you have until the last class to complete a finished version to be handed in as the term paper. It is expected that the final product will respond in some way to the various critiques raised by cabinet.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information School: School of Resource and Environmental Management

Abbreviation Code: REM New Course No: 346 Credit Hours: 3 Vector: 2-0-2

Title of Course: IMPACT ASSESSMENT

Calendar Description of Course: The goals of this course are to review and evaluate the principal theoretical impact assessment methods used to assess resource development, transportation, as well as regional planning, and policy proposals. To do so, federal, provincial, regional, and municipal institutional arrangements and assessment strategies are covered. A selection of recent impact assessments will be assessed.

Nature of Course: Lecture, laboratory

Prerequisites (or special instructions): REM 100, 200, and 342

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? Annually

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?

John Chadwick Day

3. Objectives of the Course (rationale): This course introduces students to the theory and practice of impact assessment. Many students will use the techniques and knowledge of the institutional arrangements covered in the course in a professional context following graduation.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty:	None
Staff:	See attached schedule for new faculty and staff
Library:	modest: potentially a few new volumes; reserve readings
Audio Visual:	slide, overhead, and video projectors
Space:	lecture and laboratory rooms
Equipment:	rental vans for field trips

5. Approval

Date: May 11, 1996

May 11, 1996

[Signature]
Department Chair

[Signature]
Dean

[Signature]
Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 346-3

Impact Assessment

The goals of this course are to review and evaluate the principal theoretical impact assessment methodologies associated with resource development, transportation, regional planning, and policy analysis. To do so, federal, provincial, regional, and municipal institutional arrangements and assessment strategies are covered. A selection of recent case studies of impact assessments will be reviewed by the class.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Lecture Topics

A. Introduction and overview of issues

B. Comprehensive Assessment Methods

1. Comprehensive assessment methods I
2. Comprehensive assessment methods II
3. Initial assessment methods; screening and scoping; cumulative effects assessment
4. Bench marking; monitoring; compensation and mitigation; intervener funding
5. Special topics; boom and bust towns; heritage assessment; traditional native knowledge

C. Institutional Arrangements: Canada v. the United States

1. Federal environmental assessment:
2. Provincial-state environmental assessment:
3. Regional and municipal environmental assessment:

D. Economic Sectors

1. Forestry
2. Mining
3. Transportation
4. Industry and hazardous facilities

References

- Bartlett, Robert V. 1988. "Policy and Impact Assessment." **Impact Assessment Bulletin** 6 (3-4):73-74.
- Beanlands, G.E. 1985. "Ecology and Impact Assessment in Canada," pp. 1-20. In **New Directions in Environmental Impact Assessment in Canada**, edited by Virginia W. Maclaren and Joseph B. Whitney. Toronto, ON.: Methuen. (Handout)
- Beanlands, Gordon E. and Duinker, Peter N. 1983. **An Ecological Framework for Environmental Impact Assessment in Canada**. Halifax, NS: Institute for Resource and Environmental Studies, Dalhousie University. (JCD)
- Bowles, Roy T. 1981. **Social Impact Assessment in Small Communities**. Toronto, ON: Butterworths. (JCD)
- Bowles, Roy T., ed. 1982. **Little Communities and Big Industries: Studies in the Social Impact of Canadian Resource Extraction**. Scarborough, ON: Butterworths. (JCD)
- Caldwell, Lynton K. 1988. "Environmental Impact Analysis: Origins, Evolution, and Future Directions." **Impact Assessment Bulletin** 6(3-4):75-83.
- Canadian Environmental Assessment Research Council. 1991a. **Integrating Economics and EIA: Institutional Design and Analytical Tools**, by Peter K. Stokoe. Ottawa, ON: Supply and Services Canada.
- _____. 1990a. **Application of Native Knowledge in EIA: Inuit, Eiders and Hudson Bay Oil**, by Douglas J. Nakashima. Ottawa, ON: Supply and Services Canada (Handout)
- _____. 1990b. **EIS Process and Decision Making**, by Yves Phaneuf. Ottawa, ON: Supply and Services Canada.
- _____. 1990c. **Environmental Assessment and Aboriginal Claims: Implementation of the Inuvialuit Final Agreement**, by Maureen G. Reed. Ottawa, ON: Supply and Services Canada. (Handout)
- _____. 1990d. **The Integration of Environmental Considerations into Government Policy**, by Francois Bregha *et al.* Ottawa, ON: Supply and Services Canada. (Handout)
- _____. 1989?. **The Place of Negotiation in Environmental Assessment**. Ottawa, ON: Supply and Services Canada. (Handout)
- _____. 1988a. **The Assessment of Cumulative Effects: A Research Prospectus**. Ottawa, ON: Supply and Services Canada. (Handout)
- _____. 1988b. **Evaluating Environmental Impact Assessment: An Action Prospectus**. Ottawa, ON: Minister of Supply and Services Canada. (Handout)
- _____. 1988c. **Mitigation and Compensation Issues in the Environmental Assessment Program: A Research Prospectus**. Ottawa, ON: Supplies and Services Canada. (Handout)

- _____. 1987a. **Cumulative Effects Assessment in Canada: An Agenda for Action and Research**, by E.B. Peterson *et al.* Ottawa, ON: Supply and Services Canada. (Handout)
- _____. 1987b. **A Framework for Effective Monitoring**, by Natalia M. Krawetz *et al.* Ottawa, ON: Supply and Services Canada. (Handout)
- _____. 1986a. **Learning from Experience: A State-of-the Art Review and Evaluation of Environmental Impact Assessment Audits**, by David A. Munro *et al.* Ottawa, ON: Supply and Services Canada. (Handout)
- _____. 1986c. **Risk Management and EIA: Research Needs and Opportunities**, by A.P. Grima, *et al.* Ottawa, ON: Supply and Services Canada. (Handout)
- Canadian Environmental Assessment Research Council and U.S. National Research Council. 1986. **Cumulative Environmental Effects: A Binational Perspective**. Hull, PQ: CEARC. (Handout)
- Dee, Norbert *et al.* 1973. "An Environmental Evaluation System for Water Resource Planning." **Water Resources Research** 9(3):523-35. (Handout)
- Dixon, Mim. 1980. **What Happened to Fairbanks? The Effects of the Trans-Alaska Oil Pipeline on the Community of Fairbanks, Alaska**. Boulder, CO: Westview Press. (JCD)
- Elliot, Michael Lawrence. 1981. "Pulling the Pieces Together." **Amalgamation in Environmental Impact Assessment**. **Environmental Impact Assessment Review** 2(1):11-38. (Handout)
- Finsterbusch, Kurt. 1985. "State of the Art in Social Impact Assessment." **Environment and Behaviour** 17(2):193-221.
- Finsterbusch, Kurt and Wolf, C.P. 1981. **Methodology of Social Impact Assessment**. 2d ed. Stroudsbury, PN.: Hutchinson Ross (Library, JCD)
- Fitzsimmons, *et al.* 1977. **Social Assessment Manual: A Guide to the Preparation of the Social Well-Being Account for Planning Water Resources Projects**. Boulder, CO: Westview Press. (Library, JCD)
- Leopold, Luna B. October 1969. "Landscape Esthetics," **Natural History** 78(8):36-44. (Handout)
- Lucas, Rex A. 1971. **Minetown, Milltown, Railtown: Life in Canadian Communities of Single Industry**. Toronto, ON: University of Toronto Press. (Library, JCD)
- McHarg, Ian L. 1968. "A Comprehensive Highway Route Selection Method," **Highway Research Record** 246:1-15. (Handout)
- McHarg, Ian L. 1971. **Design with Nature**. Garden City, NY: Doubleday/Natural History Press. (JCD)
- Moen, Elizabeth *et al.* 1981. **Women and the Social Costs of Economic Development: Two Colorado Case Studies**. Social Impact Assessment Series No. 5. Boulder, CO: Westview Press. (JCD)

Shpyth, Albert A. 1991. "An Ex-Post Evaluation of Environmental Impact Assessment in Alberta: A Case Study of the Oldman River Dam." **Canadian Water Resources Journal** 16(4):367-79.

Sills, David L. *et al.* 1982. **Accident at Three Mile Island: The Human Dimensions.** Boulder, CO.: Westview Press. (JCD)

U.S. Department of the Interior. Geological Survey. 1971. **A Procedure for Evaluating Environmental Impact**, by Luna B. Leopold *et al.* Geological Survey Circular 645. Washington, DC: USGS. (Handout)

Whitney, J.B.R. and Maclaren, V. W. 1985. "A Framework for the Assessment of EIA Methodologies," pp. 1-32. In **Environmental Impact Assessment: Current Approaches in the Canadian Context**, J.B.R. Whitney and V.W. Maclaren eds. Toronto, ON Institute

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 347 Credit Hours: 3 Vector: 2-1-0

Title of Course: **PLANNING AND MANAGEMENT OF PROTECTED AREAS**

Calendar Description of Course: This course addresses fundamental issues in the planning and management of protected areas in Canada, in particular: parks, wilderness areas, and ecological reserves. This course is designed to give students an overview of the status and planning for protected areas in Canada, the role and impact of recreation on protected areas, and the management of protected areas.

Nature of Course: Lectures and tutorials

Prerequisites (or special instructions): REM 100, 200 and GEOG 214

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1997-3

Which of your present faculty would be available to make the proposed offering possible?

Pamela Wright

3. Objectives of the Course (rationale) To give students an overview of the status and planning for protected areas in Canada, the role and impact of recreation on protected areas, and the management of protected areas.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

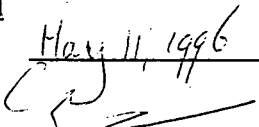
Library: Adequate

Audio Visual: Adequate

Space: Lecture and tutorial rooms

Equipment: None

5. Approval

Date: May 11, 1996 May 11, 1996 _____
 Parveen Bawa _____
 Department Chair Dean Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 347-3

Planning and Management of Protected Areas

This course will address fundamental issues in the planning and management of protected areas in Canada, in particular parks, wilderness areas, and ecological reserves. This course is designed to give students an overview of the status and planning for protected areas in Canada, the role and impact of recreation on protected areas, and the management of protected areas. Specific issues to be addressed include: definitions of wilderness, representative protected areas; systems design; management and planning agencies; international treaties and designations; the role of non-profits in management; traditional knowledge and planning; comanagement and land claims as related to protected areas; backcountry recreational use and demand; commercial backcountry recreation; and wilderness management.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	20%	Final examination	30%

Lecture Topics:

- A. Philosophy of Wilderness
 1. What is wilderness?
 2. Historical origins of the wilderness concept
 3. Roots of wilderness appreciation

- B. Planning for Protected Areas
 1. Principles of systems planning
 2. Criteria for representation
 3. Ecological planning criteria

- C. Protected Areas Systems
 1. Provincial parks
 2. Federal parks
 3. Ecological reserves
 4. Conservation authorities and the role of municipalities
 5. Special management areas
 6. International designations

- D. Backcountry Recreation Demand & Supply
 1. Recreation demand
 2. Recreational opportunity spectrum
 3. Recreational conflict

- E. Protected Areas Management
 1. Ecosystem planning
 2. Visitor impact management
 3. Principles of protected areas management

- F. Tourism and Protected Areas
 1. Commercial backcountry recreation
 2. Ecotourism

- G. Organizational Frameworks
 1. Provincial and Federal responsibilities
 2. International designations and organizations
 3. Non-Governmental organizations

- H. Contemporary Issues in Protected Areas Planning
 1. Comanagement of protected areas
 2. Marine protected areas
 3. Recreational corridors and trails
 4. Land claims and protected areas

References

Bella, Leslie. 1987. Parks for profit. Montreal, PQ: Harvest House.

*Dearden, Phil and Rick Rollins (eds.). 1993. Parks and protected areas in Canada. Don Mills, ON: Oxford University Press.

Dooling, Peter J. 1985. Parks in British Columbia. Faculty of Forestry, University of British Columbia, Vancouver, BC: D.W. Friesen and Sons.

Hendee, John C., G. H. Stankey and R. C. Lucas. 1990. Wilderness management. Golden, CO: North American Press.

Hummel, Monte, 1989. Endangered spaces: The future for Canada's wilderness. Toronto, ON: John Wiley and Sons, Inc.

Wall, Geoffrey (ed). 1989 Outdoor recreation in Canada. Toronto, ON: Wiley & Sons.

Wall, Geoffrey. 1977. The environmental impact of outdoor recreation. Waterloo, ON.: Dept. of Geography, Faculty of Environmental Studies, University of Waterloo.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 350 Credit Hours: 3 Vector: 2 -1- 0

Title of Course: ENERGY PLANNING AND MANAGEMENT

Calendar Description of Course: This course will examine the integration of energy supply and energy demand management to formulate cohesive and efficient energy policies. Topics include thermodynamics, modelling, conservation, energy pricing, oil markets, project assessment, the environment and energy planning in developing countries.

Nature of Course: Lecture, tutorial

Prerequisites (or special instructions): ECON 103, 105, REM 100, 200

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?

Mark Jaccard

3. Objectives of the Course (rationale) This course takes an interdisciplinary approach to providing students with an initial understanding of the pervasive role of energy in society, and of the consequent challenges to energy planning and management. The course includes analysis of the physical, economic, social, environmental, and policy issues of energy production, trade, and utilization.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: None, reserve readings

Audio Visual: Slide, overhead, and video projectors

Space: Lecture and tutorial rooms

Equipment: None

5. Approval

Date:

May 11, 1996May 11, 1996Pawan Bawa

Department Chair

Dean

Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT**Bachelor of Resource and Environmental Management (BREM)****REM 350-3****Energy Planning and Management**

This course takes an interdisciplinary approach to providing students with an initial understanding of the pervasive role of energy in society, and of the consequent challenges to energy management and energy policy-making. The course includes analyses of the physical, economic, social, environmental and policy issues of energy production, trade and utilization.

Lecture Topics

- thermodynamic principles
- thermodynamics and definitions of sustainability
- energy theories of value
- energy sources, energy carriers, and energy services
- world energy supply and demand
- geopolitics of trade in energy commodities
- physics, engineering, and economics of energy efficiency
- impacts of technological change on energy use
- impacts of structural change on energy use
- energy and economic rent
- energy and the resource scarcity debate
- techniques of modeling energy demand and supply
- energy uncertainties and decision analysis techniques
- integrated, least-cost energy planning
- energy regulation
- energy project assessment
- energy and social policy
- energy and the environment
- energy and third world development

Many analytic techniques and policy approaches of energy management can be applied to other resources such as conservation of water and land. Where appropriate, some of these are examined, and students with an interest in applying these techniques to other resources may be allowed to do so in their term paper.

Class Format

The class is a combination of lectures, seminars, and guest lectures. Students have considerable opportunity to explore various issues and discussion is encouraged. Since the course is biased toward practical concerns of energy resource managers, be they in the private or public domain, there will be several guest speakers.

Student Evaluation

Book review (Soft Energy Paths- A. Lovins)	20%
Term paper (max. 20 pages, student chosen topic)	40%
Mid term examination	20%
Class participation (plus 1 or 2 take-home problems)	20%

References

There is no required text. Copies of the September 1990 issue of Scientific American may be available at the SFU bookstore. A set of photocopied readings will be available at the REM office.

Detail of Course Outline and Proposed Readings

A. Physical Analysis

- thermodynamics, energy transformation, energy, definitions of sustainability, conversion coefficients, energy balance tables

Readings:

- House of Commons, Canada, Energy Alternatives, 1980, pp. 15-18.
- Miller, Energy and Environment, 1980, pp. 10-18 & 35-42.
- Georgescu-Roegen, The crisis of resources: its nature and its unfolding, in Daneke, Energy, Economics and the Environment, 1982.
- Schaeffer, Energy and energy policy: a possible match?, 1989.

B. Global Supply and Demand

- energy sources, carriers and services, historical trends, relative magnitudes, resource location, production, consumption, energy trade.

Readings:

- Davis, Energy for planet Earth, Sci. Am., Sept. 1990.
- Fulkerson et al., Energy from fossil fuels, Sci. Am., Sept. 1990.
- Weinberg and Williams, Energy from the sun, Sci. Am., Sept. 1990.
- Hafele, Energy from nuclear power, Sci. Am., Sept. 1990.
- Griffin and Steele, Energy Economics and Policy, 1986, pp. 2-33.
- Chandler et al., Energy for the Soviet Union, Eastern Europe and China, Sci. Am., Sept. 1990.

C. Issues in Energy Economics

- prices and interfactors and interenergy substitution, natural monopoly, marginal cost pricing, oligopoly and cartels, economic rent and taxation, market failures.

Readings:

- McGuigan and Moyer, Managerial Economics, 1989, pp. 548-53, 697-715.
- Jaccard, Marginal cost pricing: principles and application to BC, Lecture Notes, 1989.
- Gunton and Richards, Political economy of resource policy, in Resource Rents and Public Policy, 1987, pp. 1-58.
- Fisher and Rothkopf, Market failure and energy policy, Energy Policy, 1989, pp. 397-218.

D. Techniques of Energy Supply and Demand Forecasting

- defining reserves and resources, linear programming, econometrics, input-output, energy service models.

Readings:

- McGuigan and Moyer, Managerial Economics, 1989, pp. 119-141.
- Abilock et al., MARKAL, a multiperiod linear-programming model for energy systems analysis, Brookhaven National Lab. 1978.
- McGuigan and Moyer, Managerial Economics, 1989, pp.267-326.
- Jaccard, Description and Analysis of Energy End-Use Modelling and Forecasting, 1987.
- Braithwait, Electric utility strategic forecasting in a competitive environment, EPRI, 1987.

E. Techniques of Integrated Energy Planning

- life cycle cost, conservation supply curve, integrated least cost planning, demand side management, non-utility generation, government intervention, cost-benefit analysis, multi-attribute analysis, incorporating uncertainty, public involvement.

Readings:

- Nilsson, Technology Menu: standard economic measures, 1990.
- Meier and Usibelli, Supply Curves of Conserved Energy: A Tool for Least-Cost Energy Analysis, 1985.
- Fickett et al., Efficient use of electricity, Sci. Am. Sept. 1990.
- Jaccard and Tremain, Electricity conservation investment within least cost energy planning, 1990.
- Goldemberg et al., Energy for a Sustainable World, 1985, pp.371-375.
- Simpson and Walker, Extending Cost-Benefit Analysis for Energy Investment Choices, Energy Policy, 1987, pp.217-227.
- Daneke and Lawrence, Life-Quality Accounting Systems and the Energy Transition, in Daneke, Energy, Economics and the Environment, 1982, pp.69-68.
- Andrews, Spurring inventiveness by analyzing tradeoffs: a public look at New England's electricity alternatives, 1990.
- Bodlund et al., The challenge of choices: technology options for the Swedish electricity sector, in Electricity, Johansson (ed.) 1989.

F. Energy Institutions and Energy Regulation

- crown corporations, utility commissions, government agencies, international organisations, OPEC, North West Power Planning Council

Readings:

- Griffin and Steele, Energy Economics and Policy, 1986, pp. 105-27.
- Jaccard, "Electric Utilities in the U.S.: New Constraints and New Strategies," Energie Internationale, 1988.
- NWPPC, Annual Report, 1990.
- Mills, Electricity prices and energy use in Sweden and Denmark, 1990.

G. Energy and the Environment

- environmental impacts of alternative energy futures, decision making under uncertainty, regulatory and economic policy instruments

Readings:

- Miller, Energy and Environment, 1980, pp. 43-56.
- Cooper, Energy and Ecology: the Basic Issues, in Daneke, Energy, Economics and the Environment, 1982, pp. 25-37
- Robinson, Decarbonating energy systems, Energy Studies Review, 1990.
- Holdren, Energy in Transition, Sci. Am. Sept. 1990.
- Bleviss and Walzer, Energy for Motor Vehicles, Sci. Am. Sept. 1990.
- Ross and Steinmeyer, Energy for Industry, Sci. Am. Sept. 1990.
- Bevington and Rosenfeld, Energy for Buildings and Homes, Sci. Am.,S.1990.

H. Energy and Developing Countries

- dual economy, fuelwood, electrification, environment, international negotiations

Readings:

- Reddy and Goldemberg, Energy for the Developing World, Sci. Am., Sept. 1990.
- Leach, Residential Energy in the Third World, Annual Review of Energy, 1988, pp.47-65.
- Gill, Improved Stoves in Developing Countries, Energy Policy, 1987, V.15(2), pp. 135-44.
- Bradley et al., Development Research and Energy Planning in Kenya, Ambio, 1985, V.14, pp. 228-36.

I. Scanning the Horizon

- OPEC, environmental constraint, third world demand, technological evolution, supply and demand, policies.

Readings:

- Schwartz, "What Happened to the Energy Crisis? Annual Review of Energy, 1987, pp. 397-414.
- The Economist, "OPEC 2000", Feb. 4, 1989.
- Goldemberg et al., "An End-Use Oriented Global Energy Strategy, Annual Review of Energy, 1985, pp. 613-688.
- Katzman, How far can the world get on energy efficiency alone? 1989.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 356 Credit Hours: 3 Vector: 2-1-0

Title of Course: INSTITUTIONAL ARRANGEMENTS FOR SUSTAINABLE ENVIRONMENTAL
MANAGEMENT

Calendar Description of Course: This course provides an overview of some basic legislation, agencies, and policies which currently are in use to regulate the natural environment at the international, national, provincial, regional, and local levels. Its purpose is to present a basic set of evaluative questions which can be used to address the effectiveness and efficiency of the environmental regulatory and management systems currently in use.

Nature of Course: Lecture, tutorial

Prerequisites (or special instructions): REM 100, 200

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? twice annually

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?

None—new faculty needed

3. Objectives of the Course (rationale) This course will make students aware of the complexity of institutional arrangements for environmental management and the major problems inherent in our current regulatory systems at all levels of government. It will lead into specialized courses that will examine specific, innovative management models in terms of their applicability in promoting environmental sustainability.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year:	See attached schedule for new faculty and staff
Staff for third year:	See attached schedule for new faculty and staff
Library:	Modest: potentially a few new volumes, reserve readings
Audio Visual:	Slide, overhead, and video projectors
Space:	Lecture and tutorial rooms
Equipment:	None

5. Approval

Date:

May 11, 1996May 11, 1996Parveen Bawa

Department Chair

Dean

Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 356-3

Institutional Arrangements for Sustainable Environmental Management

This course provides an overview of some basic legislation, agencies, and policies which currently are in use to regulate the natural environment at the international, national, provincial, regional, and local levels. Its purpose is to present a basic set of evaluative questions which can be used to address the effectiveness and efficiency of the environmental regulatory and management systems currently in use.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Lecture Topics

- A. Evaluating Institutions: An Assessment Strategy and Criteria
- B. The Evolution of Concern
 - 1. Brundtland
 - 2. Agenda 21
- C. Agencies and Programs
 - 1. International: UNDP, UNEP, FAO, OAS
 - 2. National: CIDA, IDRC, AID,
 - 3. Protocols Air, Biodiversity, Food, Oceans
 - 4. Financial: World Bank, International Monetary Fund, Regional Banks
- D. NGOs
- E. Research
 - 1. World Watch
 - 2. UN, Banks
 - 3. Specialized interest groups
- F. Canadian Federal
 - 1. Legislation-Jurisdiction
 - 2. Agencies
 - 3. Policy
 - 4. The role of NGOs: Agencies, actions
- G. Canadian Provincial
 - 1. Legislation-Jurisdiction
 - 2. Agencies
 - 3. Policy
 - 4. The role of NGOs: Agencies, actions

H. Regional-Municipal

1. Legislation-Jurisdiction
2. Agencies
3. Policy
4. The role of NGOs: Agencies, actions

References

- Bell, Michael W. 1993. *China at the Threshold of a Market Economy*. Washington, D.C.: International Monetary Fund.
- British Columbia Round Table on the Environment and the Economy. 1990. *Reforming the Decision Making Process for Forest Land Planning in British Columbia*, by T.I. Gunton, and I. Vertinsky. Victoria, BC.
- Brown, Lester R, et al. latest edition. *State of the World: A Worldwatch Institute Report on Progress Toward a Sustainable Society*. New York, NY: W.W. Norton
- Canada. 1990. *Canada's Green Plan*. Ottawa, ON: Minister of Supplies and Services Canada.
- Canada. Inquiry on Federal Water Policy. 1985. *Currents of Change*. Ottawa, ON: Environment Canada.
- Canadian International Development Agency. April 1992. *Annual Report 1990-91*. Ottawa, ON: Minister of Supply and Services. ISSN 0-839-2382.
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SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: New Course No: REM 360 Credit Hours: 3 Vector: 3-0-0Title of Course: **SPECIAL TOPICS IN RESOURCE AND ENVIRONMENTAL MANAGEMENT**

Calendar description of course:

Special topics in areas not currently offered within the BREM Program

Nature of Course:

Prerequisites (or special instructions): **REM 100, 200 and others to be specified**What course(s), if any, is being dropped from the calendar if this course is approved: **None**2. SchedulingHow frequently will the course be offered? **When a new course number is needed.**Semester in which the course will first be offered? **When a new course number is needed**Which of your present faculty would be available to make the proposed offering possible? **Unknown**3. Objectives of the Course (rationale)**There will be considerable experimentation with new courses which will be tried once or twice before deciding if a permanent course should be proposed.**4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty: **Unknown**Staff: **None**Library: **Unknown**Audio Visual: **Slide, overhead, and video projectors**Space: **Lecture and tutorial rooms**Equipment: **None**5. ApprovalDate: May 11, 1996 May 13, 1996 _____
Department Chair
Dean

Chair, SCUS

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 404 Credit Hours: 3 Vector: 2-1-0

Title of Course: METHODS AND TOOLS FOR RESOURCE PLANNING AND MANAGEMENT

Calendar description of course: An introduction to research methods and tools for resource and environmental planning and management. This course provides students with an overview of: the role of science, research methods, the benefits and limitations of various research methods, and hands-on experience with common research methods and tools.

Nature of Course: Lecture, tutorial

Prerequisites (or special instructions): REM 100, 200, Math 151 or 154 or 157, STAT 101 or 103 or 301

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1999-3

Which of your present faculty would be available to make the proposed offering possible?

None: new faculty needed

3. Objectives of the Course (rationale) Students will develop skills and insight into the design, implementation and analysis of interdisciplinary research in natural resource and environmental management. This will help prepare students to carry out their own research projects.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: No additional resources

Audio Visual: No additional resources

Space: Lecture and tutorial rooms

Equipment: Computer lab for 1-3 tutorials

5. Approval

Date:

May 11, 1996

May 11, 1996


Department Chair


Dean


Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 404-3

Methods and Tools for Resource Planning and Management

An introduction to research methods and tools for resource and environmental planning and management. This course will provide students with an overview of: the role of science, research methods, the benefits and limitations of the methods, and some hands-on experience with common research methods and tools.

Grading Distribution:

Mid-Term	30%	Tutorial Presentation	10%
Homework	30%	Final	30%

Lecture Topics:

A. The Scientific Method and The Research Process

Students will be able to:

1. Define research: process and ends sought
2. Discuss the characteristics of research
3. List and define the types of research
4. Compare problem solving to the research process
5. Discuss the ethical and political implications of doing research

B. Defining a Problem

Students will be able to:

1. Describe sources of research problems
2. Describe factors to consider in choosing a problem
3. Differentiate between applied and theoretical problems
3. Describe the process of developing a problem statement
4. Differentiate between independent and dependent variables
5. Define and write problems statements

C. Objectives and Hypotheses

Students will be able to:

1. Write research objectives for survey, ex post facto, and experimental research
2. Evaluate objectives
3. Discuss the testing of hypotheses
4. Developing and alternative hypotheses

D. Research Design

Students will be able to:

1. Describe the types, purposes, and steps for descriptive research
2. Describe the features, limitations of correlational and ex post facto research
3. Define appropriate experimental design procedures
4. Explore the use of modeling as a research tool

E. Working With Data

Students will be able to:

1. Describe steps in manipulation of data including: data formatting, input, manipulation, storage, and analysis
2. Examine data bases and storage programs
3. Discuss the advantages and disadvantages of different data analysis programs
4. Describe techniques for graphic display of results

F. Writing and Critiquing Research

Students will be able to:

1. State the problem and reviewing the literature
2. Describe the methodology
3. Present findings
4. Discuss findings

References:

Campbell, Donald T., and Julian C. Stanley. 1966. *Experimental and Quasi-Experimental Designs for Research*. Boston, MA: Houghton Mifflin Company.

Friedlander, Michael W. 1972. *The Conduct of Science*. Englewood Cliffs, NJ.: Prentice-Hall.

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Jackson, Winston. 1988. *Research Methods for Survey Design and Analysis*. Scarborough, ON: Prentice-Hall.

Sanders, William B., and Thomas K. Pinhey. 1983. *The Conduct of Social Research*. New York, NY: CBS College Publishing.

Sproull, Natalie L. 1988. *Handbook of Research Methods: A Guide for Practitioners and Students*. Metuchen, NJ: Scarecrow Press.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information School: School of Resource and Environmental Management

Abbreviation Code: REM New Course No: 410 Credit Hours: 3 Vector: 2-0-2

Title of Course: ENVIRONMENTAL QUALITY ASSESSMENT AND MANAGEMENT

Calendar description of course: Sustaining a healthy environment is a crucial component of environmental planning and management. Future environmental planners and managers require knowledge of the theory and practical application of current tools for the assessment and management of environmental quality. In addition, future environmental planners and managers need to have up-to-date knowledge of methodologies of environmental quality assessment applied in Canada.

Nature of Course: Lectures, laboratories

Prerequisites (or special instructions): REM 100, 200

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1999-3

Which of your present faculty would be available to make the proposed offering possible?

None - new faculty member needed

3. Objectives of the Course (rationale) The purpose of this course is to provide students with the theory and practical application of tools and methodologies for the assessment and management of environmental quality of environmental systems.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: Adequate

Audio Visual: Slide, overhead, and video projectors

Space: Laboratories

Equipment: Field and Laboratory Work

5. Approval

Date:

May 11, 1996

May 11, 1996

[Signature]
Department Chair

[Signature]
Dean

Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 410-3

Environmental Quality Assessment and Management

Rationale

Sustaining a healthy environment is a crucial component of environmental planning and management. Future environmental planners and managers require knowledge of the theory and practical application of current tools for the assessment and management of environmental quality. In addition, future environmental planners and managers need to have up-to-date knowledge of methodologies of environmental quality assessment applied in Canada.

Objective

The purpose of this course is to provide students with the theory and practical application of tools and methodologies for the assessment and management of environmental quality of environmental systems.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Format

Classes consist of 60% lectures and 40% labs and field trips.

Curriculum

Qualitative and quantitative assessment of environmental hazards

Assessment and monitoring of environmental stresses

Environmental Quality Criteria & standards

Design of monitoring programs

Managing monitoring programs

Interpretation of monitoring data

Canadian Environmental Effects Monitoring Program

Remediation

REQUIRED READINGS

The course will make extensive use of the following 2 books:

"Biological Monitoring of Aquatic Systems"

by S.L. Loeb and A. Spacie, Lewis Publishers, ISBN 0-87371-910-7

"Biological Assessment and Criteria"

by W.S. Davis and T.P. Simons, Lewis Publishers, ISBN 0-87371-894-1

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 412 Credit Hours: 3 Vector: 1-2-0

Title of Course: ENVIRONMENTAL MODELING

Calendar description of course: Students receive hands-on experience in the construction and analysis of computer simulation models of environmental and ecological systems and problems.

Nature of Course: Lectures and tutorials

Prerequisites (or special instructions): BISC-204, REM 100 and 200, MATH 151 or 154 or 157, MATH 152 or 155, MATH 310, STAT 101 or 103 or 301

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1998-3

Which of your present faculty would be available to make the proposed offering possible?

Dr. Frank Gobas

3. Objectives of the Course (rationale) Environmental management requires an understanding of the behaviour of complex environmental and ecological systems in order to properly consider the potential consequences of management actions to be used to predict efficient management systems. Computer simulation modeling is one of tools to accomplish this as it can be an essential component of effective environmental management.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year:	See attached schedule for new faculty and staff
Staff for third year:	See attached schedule for new faculty and staff
Library:	Adequate
Audio Visual:	Slide, overhead, and video projectors
Space:	IBM teaching lab for 50 studentets - shared with REM XXX
Equipment:	Computers

5. Approval

Date:	<u>May 11, 1996</u>	<u>May 11, 1996</u>	_____
	<u>[Signature]</u>	<u>[Signature]</u>	_____
	Department Chair	Dean	Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT**Bachelor of Resource and Environmental Management (BREM)****REM 412-3****Environmental Modeling**

Environmental management requires a comprehension of the behaviour of complex environmental and ecological systems in order to project the potential consequences of potential management actions. Computer simulation modeling is one of the most important tools to accomplish this and it is an exciting new discipline in environmental management.

This course is intended to:

1. Provide students with hands-on experience in the construction and analysis of computer simulation models of environmental and ecological systems and problems;
2. Explore model behaviour under various assumptions and simulated management actions;
3. Introduce students to the practical use of models in research and decision making; and
4. Provide students with practical experience in the application of environmental and ecological simulation models to address environmental problems.

The course consists of 20% lectures and 80% computer laboratories. Classes are held in the IBM teaching lab. Students will construct and analyze computer simulation models on PCs using spreadsheets and modern programming languages. The lectures address various aspects of modelling in environmental management, including techniques to develop management models.

Grading Distribution:

Three assignments each worth 30%	90%
Contribution to class discussion	10%

Lecture Topics

I. THEORETICAL

A. INTRODUCTION

1. Course Objective
2. What are models?
3. Use of models in science
4. Use of models in management
5. Relationship between management and science

B. CONCEPTS OF MODELLING AND MODELING STRATEGY

1. Defining a model (verbal, conceptual, physical, mathematical)
2. Model components
3. Modelling procedure
4. Steps in model building
5. Modelling complexity and structure
6. Verification, calibration, validation
7. Sensitivity analysis
8. Types of models: descriptive, statistical and process oriented models
9. Time dependent and state dependent rules of change

C. MODEL BUILDING

1. Conceptual models
2. Types of conceptual diagrams
3. Conceptual diagrams as modelling and management tools
4. Model basis
5. Basics of computer programming

D. STATIC, DYNAMIC and SIMULATION MODELS

1. Linear models
2. Static models
3. Dynamic models
4. Difference and differential equations
5. Analytical and numerical methods of analysis
6. Techniques and characteristics of numerical simulation
7. Useful methods and equations for parameter fitting

E. MODEL BEHAVIOUR AND SENSITIVITY ANALYSIS AND CONFIDENCE LIMITS OF MODELS

1. Analysis of model behaviour
2. Sensitivity analysis parameters, assumptions, variable definition, bounding, initial conditions
3. Quality of fit
4. Methods to determine confidence limits on model estimation

5. Monte Carlo simulation
6. Comparison with alternative models

II. PRACTICAL

- A. Introduction to spreadsheets for IBM-PC
- B. Building models in the spread-sheet environment
- C. Introduction to the Quick and Visual Basic Programming Language
- D. Building models with the Quick and Visual Basic programming language
- E. Exploring model behaviour/model confidence/sensitivity analysis
- F. Building and analysis of simulation models of environmental dynamics:
Application to pollutant and nutrient cycling in lakes and rivers
- G. Building and analysis of simulation models of ecological systems
Application to population dynamics and fisheries and wildlife management

References

- Holling, C.S. (ed.). 1978. Adaptive Environmental Assessment and Management. International series. John Wiley and Sons.
- Jorgensen S.E. 1986. Fundamentals of Ecological Modelling. New York, NY: Elsevier .
- Goldstein, L.J. Hands on QuickBasic. New York, NY: Brady.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information School: School of Resource and Environmental Management

Abbreviation Code: REM New Course No: 420 Credit Hours: 3 Vector: 0-0-6

Title of Course: **ADVANCED DYNAMICS, ANALYSIS, AND MANAGEMENT OF NATURAL RESOURCES**

Calendar description of course: This is a synthetic course which follows REM 320-3 and builds on the integrated approach to resource analysis and management introduced in it. Students will examine advanced problems in resource management and apply more advanced tools for resource analysis.

Nature of Course: Library, laboratory or field research

Prerequisites (or special instructions): REM 100, 200, 320, MATH 151 or 154 or 157, STAT 101 or 103 or 301.

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1999-3

Which of your present faculty would be available to make the proposed offering possible?

None - new faculty needed.

3. Objectives of the Course (rationale) The course builds on the integrated approach to resource analysis and management introduced in REM 320-3.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff


Library: None

Audio Visual: None

Space: Computer laboratory for 50 students

Equipment: Computers

5. Approval

Date:	<u>May 11, 1996</u>	<u>May 11, 1996</u>	
		<u>Parveen Bawa</u>	_____
	Department Chair	Dean	Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 420-3

Advanced Dynamics, Analysis, and Management of Natural Resources

This is a synthetic course which follows REM 320 and builds on the integrated approach to resource analysis and management introduced in it. Students will examine advanced problems in resource management and apply more advanced tools for resource analysis.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

A. Introduction

1. Review of key ideas from REM 320
 - hierarchy of levels of analysis of ecological systems
 - sources of problems in management failures
 - sufficiency of information and strength of inferential ability as management issues
2. Advanced tools for analysis and management
 - experimental design for management problems
 - analytical and simulation modelling
 - analysis of risk and uncertainty
 - decision analysis
 - spatially explicit data and analysis

B. Resource Problems

3. Ecosystem models and ecosystem management in fisheries.
 - multi-species fisheries
 - analysis of lake fertilization experiments
 - marine growth and survival of salmonids
 - dynamics of harvesters as a fisheries management problem
 - experimental management of fisheries
4. The fate and effects of contaminants in ecosystems
 - whole lake fertilization and acidification experiments
 - modelling multiple pathways of contaminant transport and accumulation
 - design and evaluation of policies for regulating contaminants in aquatic ecosystems

- modelling long-distance transport of airborne pollutants and their effects on aquatic systems
- modelling the global carbon budget
- from science to policy: case studies (acid rain, CFC's, atmospheric CO₂)

5. Forest stand and landscape dynamics

- analysis of managed forests and natural forests as a basis for alternative approaches to forest stand management
- large-scale analysis of natural and anthropogenic disturbance regimes
- forest harvesting and wildlife habitat: problems at different spatial and temporal scales
- integration of forests and stream ecosystem dynamics
- scientific problems in large-scale, long-term forest planning

7. Conclusions

- review of main lessons learned from case studies
- summary of the current state of natural resource management
- future directions in management
- from science to policy: analysis of policy learning and change in response to resource analysis

Bibliography

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SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 445 Credit Hours 3 Vector: 3 - 0 - 0

Title of Course: ENVIRONMENTAL RISK ASSESSMENT AND MANAGEMENT OF HAZARDOUS SUBSTANCES

Calendar description of course: Informed decision making and effective management regarding hazardous substances requires that ecological, human health, and environmental risks of use and discharge can be assessed before management decisions are made.

Nature of Course: Lectures

Prerequisites (or special instructions): BISC 312, CHEM 102, 115, REM 100, 200, MATH 151 or 154 or 157, STAT 101 or 103 or 301

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1999-3

Which of your present faculty would be available to make the proposed offering possible?

None - new faculty needed

3. Objectives of the Course (rationale) The objective of this course is to provide students with theory and practical experience in assessing ecological, human health and environmental risks of the use and discharge of hazardous substances.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: Adequate

Audio Visual: Slide, overhead, and video projectors

Space: IBM teaching lab for 50 students

Equipment: Some software

5. Approval

Date:	<u>May 11, 1996</u>	<u>May 11, 1996</u>	_____
	<u>[Signature]</u>	<u>Parveen Bawa</u>	_____
	Department Chair	Dean	Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 445-4

Environmental Risk Assessment and Management of Hazardous Substances

Informed decision making and effective management regarding hazardous substances requires that ecological, human health, and environmental risks of use and discharge can be assessed before management decisions are made. The objective of this course is to provide students with theory and practical experience in assessing ecological, human health and environmental risks of the use and discharge of hazardous substances.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Lecture Topics

1. Properties of hazardous chemicals and contaminants
2. Environmental fate of hazardous chemicals and contaminants
 - environmental partitioning
 - dynamics of environmental distribution
 - mass-balance
 - mechanisms of transport and transformation
 - fugacity
 - environmental modelling
3. Exposure assessment
 - types of exposure
 - mechanisms of uptake and elimination
 - toxicokinetics
 - bioaccumulation
 - trophodynamics
 - structure-activity relationships
4. Hazard and dose-response assessment
 - toxicity
 - dose-response relationships
 - mechanisms of toxic action
 - ecotoxicity, carcinogenesis

5. Quantitative risk assessment

- human health
- ecological and environmental risk assessment of hazardous substances

References

Mackay, D. 1991. "Multimedia Environmental Models" Chelsea, MI: Lewis Publishers

Hallenbeck, H. and K.M. Cunningham. 1991. "Quantitative Risk Assessment for Environmental and Occupational Health". Chelsea, MI: Lewis .

Books are available in the SFU bookstore.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information School: School of Resource and Environmental Management

Abbreviation Code: REM New Course No: 446 Credit Hours: 3 Vector: 2-1-0

Title of Course: RESOURCE AND ENVIRONMENTAL MANAGEMENT FOR FIRST NATIONS

Calendar description of course: An introduction to the perceptions, attitudes, and values of first nations and the ways they differ from the dominant culture. It explores the institutional structures and decision making processes currently used by first nations governments.

Nature of Course: Lecture, tutorial

Prerequisites (or special instructions): REM 100, 200, 311, 342, 343, and 356

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1999-1

Which of your present faculty would be available to make the proposed offering possible?

None - new faculty needed

3. Objectives of the Course (rationale) This course is intended for managers who intend to work for first nations, and other students who want to attain a better understanding of first nation's perceptions of, and philosophy toward, resources and the environment.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

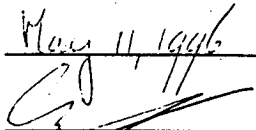
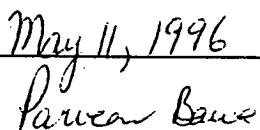
Library: Adequate

Audio Visual: Slide, overhead, and video projectors

Space: Lecture and tutorial rooms

Equipment: None

5. Approval

Date:	<u>May 11, 1996</u>	<u>May 11, 1996</u>	_____
			_____
	Department Chair	Dean	Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 446-3

Resource and Environmental Management for First Nations

This course is an introduction to the perceptions, attitudes, and values of first nations and the ways in which they differ from the dominant culture. It acquaints students with a comparison of the similarities and differences in the ways that both cultures contrast in terms of values, goals, and interpretation of North American, Canadian, and British Columbia developmental history, and view of nature. The course presents a first nations' perspective on the current systems of land use planning and land tenure, and then forestry, water and energy, fish and wildlife, mining, environmental aesthetics and tourism, and resource and environmental law. The course assists students in understanding the institutional structures and decision making processes currently used by first nations governments, and in assessing their personal interest in full-time or part-time employment with native bands.

Grading Distribution

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Lecture Topics

- A. The first four lectures cover the following basic areas of resource and environmental practice concerning first nations:
1. Introduction to the First Nations' View of the World: perceptions, attitudes, values, goals.
- B. The second section of the course presents a comparison of first nations' goals and aspirations for the management of resources and the environment vis a vis those of the dominant culture. It covers the following topics:
2. Land tenure and planning
 3. Forestry
 4. Water and energy
 5. Mining
 6. Fisheries and wildlife
 7. Environmental aesthetics, parks, and tourism
 8. The course of first nations treaty negotiations

- B. The third section of the course consists of workshops on specific case study areas of environmental and natural resource planning and management. The objectives of each workshop will be:
9. To explore interrelations among the above topic areas in light of the emerging integrated planning and management systems which are being used to make trade-offs between all of the resource and environmental values.

References

- Bombay, Harry. 1994. "Aboriginal forest strategy: Building a balanced framework for forest management." *Canadian Silviculture Magazine* 2(2/3): 22-25.
- Canada. Indian and Northern Affairs. Annual. *Indian register population by sex and residence for registry groups, responsibility centres, regions and Canada.* Ottawa, ON.
- Canadian Journal of Native Studies.*
- Legal Services Society. Native Programs Branch. *Aboriginal Justice Bulletin.*
- Madill, D. 1982. *Select annotated bibliography on British Columbia Indian policy and land claims.* Ottawa, ON: treaties and Historical Research Centre, Department of Indian and Northern Affairs.
- Native Brotherhood of BC. *Native Voice.* Vancouver, BC.
- Peters, Evelyn J. 1991. *Aboriginal self-government in Canada: a bibliography 1987-90.* Kingston, ON: Institute of Intergovernmental Relations, Queen's University.
- University of Saskatchewan. Native Law Centre. *Canadian Native Law Reporter. Annual.*
- Vancouver Public Library. History and Government Division. 1993. *Native Land Claims: A Study Guide.*

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 448 Credit Hours: 3 Vector: 2-0-2

Title of Course: TOURISM PLANNING AND MANAGEMENT

Calendar description of course: This course examines conceptual frameworks and applied methods used in the planning and management of tourism development. It places particular attention on the use of planning approaches which encourage environmentally, sustainable sensitive forms of tourism. It uses a combination of lectures, workshops, and case studies to illustrate the application of these planning strategies.

Nature of Course: Lecture, laboratories, and workshops

Prerequisites (or special instructions): BISC 312, REM 100, 200 311, 356, and 347, GEOG 389

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? Annually

Semester in which the course will first be offered? 1999-3

Which of your present faculty would be available to make the proposed offering possible?

P. Williams, A. Gill, P. Wright

3. Objectives of the Course (rationale) The overriding goal of this course is to encourage the use of planning frameworks and techniques which facilitate sustainable forms of tourism development.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: Adequate

Audio Visual: Slide, overhead, and video projectors

Space: Lecture and laboratory rooms

Equipment: None

5. Approval

Date: May 11, 1996 May 11, 1996 _____

[Signature] Parveen Bawa _____

Department Chair Dean Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT**Bachelor of Resource and Environmental Management (BREM)****REM 448-3****Tourism Planning and Management**

Course Description

This course examines conceptual frameworks and applied methods used in the planning and management of tourism development. It places particular attention on the use of planning approaches which encourage environmentally, sustainable sensitive forms of tourism. It uses a combination of lectures, workshops, and case studies to illustrate the application of these planning strategies.

Objectives:

The overriding goal of this course is to encourage the use of planning frameworks and techniques which facilitate sustainable forms of tourism development. Specific objectives related to this goal are to:

- a) create an awareness of the nature and scope of tourism planning and management issues confronting the development of tourism in Canada and abroad;
- b) outline key natural and cultural resource planning and management issues associated with tourism development;
- c) outline and assess the relative merits of various processes and techniques used in planning and managing tourism's growth toward sustainable goals.

Grading Scheme

The course will have three (3) grading situations. They will require the use of information derived from lecture material, the Special Topics reading collection, Library Reserve Shelf readings, and the general library collection. All assignments will be judged based on their content, organization, and quality of presentation. The assignments will be weighted as follows:

Assignment #	Grade Weight	Date Due
Literature review	25 %	end of 5th week
Case study report	35 %	end of 10th week
Final exam	40 %	last class of term

Suggested Readings:

Specific readings central to the course will be available in a Selected Topics reading collection available for purchase at the beginning of the course. Additional readings will be identified in bibliographic form as topics are explored during the course. Selected topics from that bibliography may be accessed through Library Reserve Shelf listings.

Assignment Outlines:

1) *Tourism Literature Review* (25% of final grade)

This assignment will involve a critical assessment of a significant trend influencing the planning and management of tourism development.

2) *Tourism Case Study* (35% of final grade)

This assignment will involve the use of techniques and methodologies examined during the term to address a particular environmental planning issue identified by the instructor.

3) *Final Exam* (40% of final grade)

This "take-home" exam will deal with the application of frameworks and methodologies discussed during the course.

Lecture Topics

1. **Tourism: From Concept To Measurement**

- concepts, definitions and measurement issues
- a systems management perspective
- nature and scope of tourism development

Suggested Readings:

Chadwick, R.A. (1987), "Concepts, definitions, and measures used in travel and tourism research", in *Travel, Tourism and Hospitality Research: A Handbook For Managers and Researchers*, (J.R.B. Ritchie and C.R. Goeldner eds.), Toronto: John Wiley, pp. 47-61.

Gunn., C.A. (1987), "A perspective on the purpose and nature of tourism research methods", in *Travel, Tourism and Hospitality Research*, pp. 3-12.

2.0 Assessing The Tourism Environment

- global influences of tourism development
- societal and cultural influences on tourism behaviour
- the ecological limits to tourism
- emerging trends and tourism behaviour

Suggested Readings:

Mill, R.C. and A.M. Morrison (1992), *The Tourism System*, Englewood -Cliffs: Prentice Hall, pp. 57-99.

Ritchie, J.R.B. Ritchie (1992), "New realities, new horizons: leisure, tourism and society in the third millennium", *The Annual Travel Review*, New York: American Express, pp. 14-26.

3.0 Understanding Tourism Behaviour

- models of tourist decision-making
- travel market segment profiling techniques
- psychographic interpretations of tourism behaviour
- the role of image in tourism destination selection

Suggested Readings:

Mill, R.C. and A.M. Morrison (1992), *The Tourism System*, pp. 131-238.

Witt, C.A. and P.L Wright (1992), "Tourist motivation: life after Maslow", in *Choice and Demand In Tourism*, (P. Johnson and B. Thomas, eds.), London: Mansell, pp. 33-55.

4.0 Managing Conflict In Tourism Environments

- the role of style and form in tourism activities
- managing host-guest interaction and conflict
- succession and displacement in tourism settings
- tourism opportunity spectrum management systems

Suggested Readings:

- Long, P.T., R.R. Perdue, L. Allen (1990), "Rural resident tourism perception and attitudes by community level of tourism", *Journal of Travel Research*, Vol. 28(3), pp. 3-9.
- Walle, A.H. (1993), "Tourism and traditional people: forging equitable strategies", *Journal of Travel Research*, Winter, pp. 14-19.

4.0 Planning And Managing The Tourism Product

- components of the tourism experience
- tourism product planning typologies
- authenticity and visitor satisfaction
- cultural tourism management issues
- environmental dimensions of the tourism product
- product market matching methods

Suggested Readings:

- Cooper, C. (1992), "The life cycle concept and tourism", in *Choice and Demand in Tourism*, pp. 145-160.

- Hodgson, P. (1990), "New tourism product development: market research's role", *Tourism Management*, March, pp. 2-5.

5.0 Attractions In the Tourism Planning and Management Process

- assessing natural resource attraction attributes
- assessing climatic attributes of tourism attractions
- assessing cultural resource attraction attributes
- assessing environmental design in tourism communities

Suggested Readings:

- Fodness, D. (1990), "Consumer perceptions of tourist attractions", *Journal of Travel Research*, Vol. 28(4), pp. 3-9.

- Brown, G. (1992), "Tourism and symbolic consumption", In *Choice and Demand in Tourism*, pp. 57-71.

- Mill, R.C. and A.M. Morrison, (1992), *The Tourism System*, pp. 263-284.

6.0 Environmental Planning Principles In Tourism Settings

- environmental design principles in tourism communities
- visual amenity planning principles in tourism regions
- sustainable development principles in tourism environments
- tourism growth management principles

Suggested Readings:

Gunn, C. (1988), *Vacationscape*, New York: Van Nostrand Reinhold, pp. 57-107.

Dorwood, S. (1990), *Design For Mountain Communities*, New York: Van Nostrand Reinhold, pp. 253-283.

Lew, A.L. (1989), "Authenticity and sense of place in tourism development", *Journal of Travel Research*, Vol. 17(4), pp. 15-22.

7.0 Tourism Economic Impact Assessment Frameworks

- indicators of economic performance
- measuring benefits and costs
- managing tourism's economic stressors

Suggested Readings:

Frechtling, D. (1987), "Assessing the impacts of travel and tourism-measuring economic benefits", *Travel, Tourism and Hospitality Research*, pp. 101-192.

Mill, R.C. and A.M. Morrisson (1992), *The Tourism System*, pp. 285-306.

8.0 Tourism Social Impact Assessment Frameworks

- indicators of social impact performance
- determinants of tourism' social impact
- frameworks for managing tourism's social impact

Suggested Readings:

Haywood, K.M. (1988), "Responsible and responsive tourism planning in the community". *Tourism Management*, June, pp. 105-118.

Crandall, L. (1987), "The social impact of tourism on developing regions and its measurement", *Travel, Tourism and Hospitality Research*, pp. 373-382.

Caneday, L. and J. Ziegler (1991), "The social, economic and environmental costs of tourism as perceived by its residents", *Journal of Travel Research*, Vol. 30(2), pp. 45-48.

9.0 Tourism Environmental Impact Assessment Frameworks

- indicators of tourism's physical impact
- the role of cumulative impact assessment
- tourism impact stressors and their management
- environmental auditing management systems and their application

Suggested Readings:

Williams, P.W. (1987), "Evaluating environmental impact and physical carrying capacity in tourism", *Travel, Tourism and Hospitality Research*, pp. 385-397.

Pearce, D. (1989), *Tourist Development*, New York: John Wiley,, pp. 229-237.

McCool, S.F. (1992), "Tourism in the northern rockies: preserving the product, protecting the future", *Western Wildlands*, 18(3), pp. 147-200.

10.0 Toward a Greener Tourism

- environmental codes of ethics and conduct
- community based planning systems in tourism destinations
- case studies of green tourism management in action

Suggested Readings:

U.S. Travel Data Center, (1992), "Environmental and tourism policy," in *Tourism and the Environment*, Travel Industry Association of America, pp. 45-54.

Hawkes, S and P. W. Williams eds. (1993), *The Greening of Tourism: A Case Book Of Best Environmental Practice*, Simon Fraser University: Centre For Tourism Policy and Research and Industry, Science and Technology Canada.

Wight, P. (1993), "Ecotourism: ethics or eco-sell?", *Journal of Travel Research*, Winter, pp. 3-9.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 455 Credit Hours: 3 Vector: 2-0-2

Title of Course: WATER PLANNING AND MANAGEMENT

Calendar description of course: This course evaluates a variety of water planning and management issues including selected theoretical models, selected federal, provincial, and international institutional arrangements and jurisdictional responsibilities, and management experiences, and emerging international, national, and provincial water resource problems and management challenges and opportunities.

Nature of Course: Lectures, field trips, tutorials

Prerequisites (or special instructions): REM 100, 200, and 331

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1999-3

Which of your present faculty would be available to make the proposed offering possible?

John Chadwick Day

3. Objectives of the Course (rationale) This course exposes students to the emerging theory and practice of integrated river basin, coastal, and municipal development. This is an area of increasing conflict globally, continentally, nationally, and provincially. The course will help prepare students to work as professional planners and managers.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: Addition of one journal

Audio Visual: Slide, overhead, and video projectors

Space: Lecture and laboratories

Equipment: Rental vehicles for field trips

5. Approval

Date:

May 11, 1996

May 11, 1996



Parveen Bawa

Department Chair

Dean

Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 455-3

Water Planning and Management

OBJECTIVES

The goals of the course are to review and evaluate a variety of water planning and management issues. These include:

1. Selected theoretical models;
2. Selected federal, provincial, and international institutional arrangements jurisdictional responsibilities, and management experiences; and
3. Emerging international, national, and provincial water resource problems and management opportunities.

After completing the course, participants will have an understanding of existing and emerging water management institutions and issues, the nature of the water manager's tasks, knowledge of a variety of techniques and approaches for gathering planning and management-related data, and how to use them in the process of planning for water and related land management.

INSTRUCTION METHODS

The course will be presented using a combination of lectures, invited speakers, seminars, student presentations, and local field trips.

COURSE GRADE

The final grade will be made up of the following components:

- | | |
|--|----|
| 1. Class participation and field trips | 30 |
| 2. Critical reviews (10 and 20) | 30 |
| 3. Final paper | 40 |

COURSE CONTENT

This course will be presented as a number of modules. In some cases, readings will be thoroughly discussed in class; in others the distributed materials will constitute background reading for your individual use. Following completion of the first six modules as well as number 8, the remaining

course content is selected by the students.

Module

1. Characteristics of the water resource: global, continental, national, and provincial.

Required reading:

- a) Postel, Sandra. 1984. **Water: Rethinking Management in an Age of Scarcity**. Paper 62. Washington, DC: Worldwatch Institute. (Bookstore). Suitable for a short paper.
- b) International Institute for Environment and Development. 1976. **Water For All**. Washington, DC: IIED. (handout). Suitable for short paper.
- c) Catley-Carleson, Margaret. 22 June 1988. "The World's Water: Living in the Very Last Drop". Paper presented to the Canadian Water Resources Association, Saskatoon, Sask. Ottawa, ON: CIDA. (handout). Suitable for a short paper.
- d) Canada. Inquiry on Federal Water Policy. 1985. **Currents of Change**, by P.H. Pearce *et al.* Ottawa, ON: Environment Canada. (handout, please return) Chapters 5: 49-60; part 3: 61-82, and chapter 10: 95-110 are suitable for short papers.
- e) Canada. Environment Canada. 1987. **Federal Water Policy**. Ottawa, ON. (handout, please return). This is suitable for a short paper.
- f) Science Council of Canada. June 1988. **Water 2020: Sustainable Use for Water in the 21st Century**. Science Council of Canada Report 40. Ottawa, ON. (handout, please return). This is suitable for a short paper.
- g) White, Gilbert F. 1987. "A Global Perspective on Western Water", pp. 19-29. In: **Water and the American West**, edit by David H. Getches Np:np. (handout)

2. Evolving Water Management Strategies and Trends in the United States.

- a) US. National Academy of Sciences and National Research Council. 1968. **Water and Choice in the Colorado Basin: An Example of Alternatives in Water Management**. Publication 1689. Washington, DC:NAS-NRC. (handout)
The Colorado River is under the most stress of the American rivers. Do not focus on the setting and institutional details unless you are interested. Instead, look at the range of choice of regional economic growth alternatives (ch. 5), water management alternatives (ch 6), and enhancing the range of choice (ch. 7).
- b) White, Gilbert F. 1969. **Strategies of American Water Management**. Ann Arbor, MI: University of Michigan Press. (handout) White outlines six types of management strategies which had evolved up to the late 1960s in the United States. Read the volume to understand not details and events but what the strategies entail. This model can then be used to evaluate progress and change over the following two decades in the US as well as Canada.

- c) Western Governors' Association. Water Efficiency Task Force 1986. **Western Water: Tuning the System**, by Bruce Driver. Salt Lake City, UT. This report illustrates how radically the U.S. states are changing their approach to water management. Big projects and more "new" water are out; conservation, pricing, and management have come of age.
- d) Frederick, Kenneth D. 1986. "Overview," pp. 1-20. In: **Scarce Water and Institutional Change**. Washington, DC: Resources for the Future. (handout)
- e) Price, Kent A. 1986. "A Water Crisis". Frederick, Kenneth D. "The Legacy of Cheap Water". Weiss, Edith Brown. "In Fairness to Future Generations". Peskin, Henry M. "Nonpoint Pollution and Natural Responsibility". Wahl, Richard W. "Cleaning Up Kesterson". All of these articles in **Resources**: 89 (Spring):1-14. (handout)
- f) Born, Stephen M. 1989. **Redefining National Water Policy: New Roles and Directions**. AWRA Special Publication No. 89-1. Bethesda, ML: American Water Resources Association.
- g) Schad, Theodore M. 1991. "Do We Have a National Water Policy". **Jour. of Soil and Water Conservation** 46(1):14-16.
- h) Viessman Jr., Warren. 1990. "Water Management Issues for the Nineties." **Water Resources Bulletin** 26(6):883-91.
- i) Van Schilfgaard, Jan. 1991. "Water Futures". **Journal of Soil and Water Conservation**. Jan-Feb: 17-19

3. River Basin Planning Theory

- a) White, Gilbert F. 1957. "A Perspective of River Basin Development". **Law and Contemporary Problems** 22(2):157-186
- b) Canada. Environment Canada. Environmental Conservation Service. 1981. **An Evaluation of the River Basin Planning and Implementation Programs**, by Bernard Brule *et al.* Ottawa, ON.
- c) LeMarquand, David G. 1977. **International Rivers: The Politics of Cooperation**. Vancouver, BC: Westwater Research Centre, University of British Columbia. A model for analyzing international experiences. (handout).

- d) Lee, Terence. 1988. "The Evolution of Water Management in Latin America". **Water Resources Development** 4 (3):160-168. Traces the development of laws, institutions, including specialized basin authorities, throughout Central and South America. (handout).
- e) Day, J.C. and Affum, J. A. 1991. **Toward Sustainable Water Planning and Management in British Columbia**. Victoria, BC: British Columbia Round Table on the Environment and the Economy. (handout)
- f) Dorsey, Anthony H.J., ed. 1991. **Perspectives on Sustainable Development in Water Management: Towards Agreement in the Fraser River Basin**. Vol. 1. Vancouver, BC: Westwater Research Centre, University of British Columbia. (handout)
- g) Fraser Basin Management Board. 1993. **Strategic Plan for the Fraser Basin Management Program: 1993-98**, Vancouver, BC.

4. **Laws and Institutional Arrangements**

- a) MacDonnel, Lawrence J. 1991. "Rethinking Western Water Law." **Hydata** 10(1):27-28.

Additional Reading

- b) Lucas, Alastair R. 1990. **Security of Title in Canadian Water Rights**. The Canadian Institute of Resources Law. Calgary, AB: Faculty of Law, The University of Calgary.

5. **Demand, Supply, Conservation**

- a) Kindler, J. and C.S. Russell, eds. 1984. **Modeling Water Demands**. Toronto, ON: Academic Press. (handout).
- b) Brooks, David B. and Peters, Roger. 1988. **Water: The Potential for Demand Management in Canada**. Ottawa, ON: Science Council of Canada. (Available free of charge from the council, 100 Metcalf St. K1P 5M.) (handout, pp. 1-28)

6. **Pricing as a Management Tool**

- a) Brooks, David B., Peter Rogers, and Paul Robillard. 1990. "Pricing: A Neglected Tool for Managing Water." **Alternatives** 17(3):40-48.

7. **Public Participation in Water and Land Management**

8. **Coastal Zone Management**

- a) Titus, James G. 1987 "The Causes and Effects of Sea Level Rise." In **Impact of Sea Level Rise on Society**, Herman G. Wind, ed. Rotterdam: A.A. Balkema. (handout).
- b) _____. 1986. "Greenhouse Effect, Sea Level Rise, and Coastal Zone Management." **Coastal Zone Management Journal** 14 (3):147-171. (handout).

- c) Hildreth, Richard G. and Ralph W. Johnson, 1985. "CZM in California, Oregon, and Washington". **Natural Resources Journal** 25 (Jan):103-165. (handout)
 - d) Canadian Council of Resource and Environment Ministers. 1978. **Proceeding of the Shore Management Symposium**. Victoria, BC: The council. (handout).
 - e) Higham, John W. and Day, J.C. 1989. "The British Columbia Offshore Exploration Environmental Assessment: An Evaluation." **Impact Assessment Bulletin** 8(1 and 2):131-43.(handout)
 - f) Day, J.C. and Gamble, Don B. 1990. "Coastal Zone Management in British Columbia. An Institutional Comparison with Washington, Oregon, and California." **Coastal Management** 18:115-41. (handout)
 - g) Gamble and Day 1989. "CZM In Boundary Bay, BC and Cherry Point, WA." (handout).
 - h) Breen, Ann and Dick Rigby. 1985. **Caution Working Water Front: The Impact of Change on Marine Enterprises**. Washington, BC: The Waterfront Press. (handout)
 - i) _____. 1986. **Fishing Piers: What Cities Can Do**. Washington, DC: The Waterfront Press. (handout)
 - j) Hotson, Norman. 1986 "Waterfront Character: What Is It, and Will Any Be Left?" In **Urban Water Fronts '86: Developing Diversity**, Ann Breen and Dick Rigby eds. Washington, DC: The Waterfront Press. (handout)
9. **Man-Made Lakes**
- a) American Geophysical Union. 1973. **Man-Made Lakes: Their Problems and Environmental Effects**, by William C. Ackermann *et al.* Monograph 40. Washington, DC: AGU. (handout)
10. **Water Diversion and Export**
- a) Day, J.C. and Frank Quinn. 1992. **Water Diversion and Export: Learning from Canadian Experience**. cover, xiii-xvi and 128-140. (handout)
11. **Ground Water**
- a) Dhamsthan, Dharmo S. July 1985. "Protecting Our Ground Water Resources: The Challenge". **Hydata** 4(4):5-8. (handout)
 - b) Poland, Joseph F., Chair. 1990. **Guidebook to Studies of Land Subsidence due to Ground Water Withdrawal**. International Hydrological Programme. NP: UNESCO.
12. **Irrigation**
- a) Frederick, Kenneth D. 1988. "Irrigation Under Stress". **Resources** 91 (Spring):1-4.
13. **Agricultural Land Drainage**
14. **Water Quality**

15. Acid Rain**16. Climatic Change****17. Riverine Flooding**

- a) Muckelstone, Keith W. 1976. "The Evolution of Approaches to Flood Damage Reduction." *Jour. of Soil and Water Conservation*, March-April: 53-59.

18. Water-Based Recreation and Esthetics**19. Soil Erosion**

- a) Clark 11, Edwin H., Jennifer A. Haverkamp, and William Chapman. 1985. **Eroding Soils: The Off-Farm Impacts**. Washington, DC: Conservation Foundation. (handout)

20. Desertification

- a) Eckholm, Erik and Lester R. Brown. 1977. **Spreading Deserts: The hand of Man**. Worldwatch Paper 13. Washington, DC. (handout)

21. Columbia Basin Management

- a) Butcher, Walter R. et al. 1986. Competition Between Irrigation and Hydropower in the Pacific Northwest", pp. 25-66. In **Scarce Water and Institutional Change**, Kenneth D. Frederick editor. Washington, DC.: Resources for the Future.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: New Course No: REM 460 Credit Hours: 3 Vector: 3-0-0Title of Course: **SPECIAL TOPICS IN RESOURCE AND ENVIRONMENTAL MANAGEMENT**

Calendar description of course:

Special topics in areas not currently offered within the BREM Program

Nature of Course:

Prerequisites (or special instructions): **REM 100, 200 and others to be specified**What course(s), if any, is being dropped from the calendar if this course is approved: **None**2. SchedulingHow frequently will the course be offered? **When a new course number is needed.**Semester in which the course will first be offered? **When a new course number is needed**Which of your present faculty would be available to make the proposed offering possible? **Unknown**3. Objectives of the Course (rationale)**There will be considerable experimentation with new courses which will be tried once or twice before deciding if a permanent course should be proposed.**4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty: **Unknown**Staff: **None**Library: **Unknown**Audio Visual: **Slide, overhead, and video projectors**Space: **Lecture and tutorial rooms**Equipment: **None**5. Approval

Date:

May 11, 1996 May 11, 1996
Department ChairParveen Bawa
Dean_____
Chair, SCUS

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM New Course No: 464-4 Credit Hours: 4 Vector: 0-4-0

Title of Course: Directed Study in Resource and Environmental Management Topics

Calendar description of course:

Directed reading in a topic chosen in consultation with a supervisor. Admission requires selection of a faculty supervisor and submission of a study topic to the department at least one month prior to the start of the semester in which the course will be taken.

Nature of Course: Library, laboratory or field research

Prerequisites (or special instructions): Permission of the department. Taken by honors students in the 4th year of study.

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? Each semester
Semester in which the course will first be offered? 1998-99
Which of your present faculty would be available to make the proposed offering possible? All faculty

3. Objectives of the Course (rationale)

An advanced area of specialization for honors students.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty: None
Staff: None
Library: None
Audio Visual: None
Space: None
Equipment: None

5. Approval

Date: May 11, 1996 May 11, 1996
[Signature] [Signature]
Department Chair Dean Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT**Bachelor of Resource and Environmental Management (BREM)****REM 464-4****Directed Study in Advanced Resource and Environmental Management Topics**

This is a required course in resource and environmental planning for fourth-year honors students. A directed reading topic is chosen in consultation with a supervisor. Admission requires selection of a faculty supervisor and submission of a study topic to the department at least one month prior to the start of the semester in which the course is to be taken.

The course may be a combination of library, laboratory or field research. A final research paper is required.

Prerequisites:

Students must be in the 4th year of study in the honors program.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 471 Credit Hours: 3 Vector: 2-0-2

Title of Course: FOREST ECOSYSTEM MANAGEMENT

Calendar description of Course: In this course students will examine the problems of managing forest ecosystems for a variety. The course will start with an examination of the ecological characteristics of forest ecosystems and their dynamics. The second section will focus on the objectives and tools of forest management in an ecological context. The final section of the course will focus on the institutions, economics and policies of forest management, with a focus on British Columbia's historical and current management issues. This course will involve lectures, group discussions, field trips and exercises, and computer labs.

Nature of Course: Lecture, Tutorial, Computer Lab

Prerequisites (or special instructions): ECON 103, 105-3, REM 200, 200, 311, and 356

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1999-1

Which of your present faculty would be available to make the proposed offering possible?

Dr. Ken Lertzman

3. Objectives of the Course (rationale) This course integrates a number of the previous components of the Environmental Studies curriculum to examine the problems of managing forest ecosystems for a variety of objectives. It will draw heavily on student's previous experience in both the natural and social sciences and will focus on the application of their knowledge to real problems.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year:	See attached schedule for new faculty and staff
Staff for third year:	Programmer/RA time needed to set up computer labs, TA's during course
Library:	Some additional library resources; 2-3 journals and some books
Audio Visual:	Slide, overhead, and video projectors
Space:	Lecture and tutorial, wet lab and computer laboratory
Equipment:	Computers, field equipment for projects (ca. \$1000; increment borers, tapes etc.), lab equipment (ca. \$10,000; dissecting microscopes, drying oven, etc.)

5. Approval

Date:

May 11, 1996May 11, 1996[Signature]
Department ChairParveen Bawa
Dean_____
Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 471-3

Forest Ecosystem Management

OBJECTIVES

1. To understand the objectives of forestry and how the basic tools of forestry are used to achieve those objectives.
2. To develop a functional knowledge of the structure and dynamics of forest ecosystems, and to appreciate the constraints and opportunities for forestry posed by ecological processes.
3. To become familiar with the history and objectives of forestry policy in B.C.
4. To use the understanding developed in meeting objectives 1-3 to analyze and understand a variety of current issues of debate in forest management.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Course Curriculum

Section 1: Introduction

What is a Tree?

What is a Forest?

What is Forestry?

The evolution of forestry: timber exploitation, timber management, forest management, ecosystem management

Section 2: Forest Ecosystems:

Vegetation Zones, Climate and Plant Growth 1: Forests of Northwestern North America.

Vegetation Zones, Climate and Plant Growth 2: Biogeoclimatic Classification System and Biogeoclimatic Zones of B.C.

Forest Ecosystem Structure and Function 1: Stand Development, Natural Disturbances, Succession

Forest Ecosystem Structure and Function 2: Carbon Cycling and Site Productivity.

Forest Ecosystem Structure and Function 3: Nutrient Cycling and Site Productivity.

Forestry, biodiversity and conservation 1: Biology of habitat dependence.

Forestry, biodiversity and conservation 2: The interface between forests and aquatic ecosystems.

Section 3: Forest Management:

Forest Ecosystem Structure and Function 4: soils and impacts of forest practices on site productivity and sustainability.

Concepts of growth and yield and rotations

Cut determination: AAC, LRSY, timber supply

Silvicultural Systems 1: traditional silvicultural systems and their objectives.

Silvicultural Systems 2: alternative silvicultural systems and their objectives.

Section 4: Forest Policy and Institutions:

Forest Policy 1: Historical development of forest policy in British Columbia

Forest Policy 2: Modern tenure systems in British Columbia

Forestry economics 1: economics of silviculture at the stand level

Forestry economics 1: stumpage, structure of forest industry and forest products markets

Forest Policy 4: The planning process and public involvement.

Forest Policy 3: Current issues in forest policy.

Section 5: Review of Major Topics Covered.**Computer Labs:**

1. Planning silvicultural interventions over stand development.
2. Growth and yield.
3. Determining allowable cuts.
4. Landscape level planning: integrating timber management with other resources.

Field Labs/Trips:

1. Local plants in an ecosystem context.
2. Silviculture/Ecology Tour of UBC Research Forest
3. Mill Tour
4. Stand Development in Low Elevation Second Growth: Seymour Demonstration Forest
5. Subalpine and Old Growth Forests: Cypress Provincial Park

References:**Books and Government Publications:**

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These books will be supplemented with various articles from periodicals such as those in the following list, which will be updated on a yearly basis:

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SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information

School: School of Resource and Environmental Management

Abbreviation Code: REM

New Course No: 475 Credit Hours: 3 Vector: 2-0-2

Title of Course: FRESHWATER ECOSYSTEM MANAGEMENT

Calendar description of Course: This course examines the physical and ecological attributes of freshwater ecosystems in the context of management issues. Students will become familiar with the diversity of freshwater ecosystems and their dynamics, the ways in which organisms interact with their physical environments and each other, the linkages between freshwater systems and riparian and terrestrial ecosystems, and the impacts of management activities on these interactions.

Nature of Course: Lecture/ Lab/ Field Trips

Prerequisites (or special instructions): REM 100, 200, and 311

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1999-3

Which of your present faculty would be available to make the proposed offering possible?

None - new faculty needed

3. Objectives of the Course (rationale)

This course will add more specialized background on freshwater ecosystems to the background developed in previous courses. Together with REM 471 (Forest Ecosystem Management) this course provides an ecosystem context for a broad variety of land management and planning issues. Students will become familiar with the diversity of freshwater ecosystems and their dynamics, the ways in which organisms interact with their physical environments and each other, the linkages between freshwater systems and riparian and terrestrial ecosystems, and the impacts of management activities on these interactions.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year:	See attached schedule for new faculty and staff
Staff for third year:	See attached schedule for new faculty and staff
Library:	Minor new requirements
Audio Visual:	None
Space:	Wet Lab
Equipment:	Microscopes, field sampling equipment

5. Approval

Date:

May 11, 1996 May 11, 1996


 Department Chair


 Dean


 Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM))

REM 475-3

Freshwater Ecosystem Management

This course examines the physical and ecological attributes of freshwater ecosystems in the context of management issues. Students will become familiar with the diversity of freshwater ecosystems and their dynamics, the ways in which organisms interact with their physical environments and each other, the linkages between freshwater systems and riparian and terrestrial ecosystems, and the impacts of management activities on these interactions.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Objectives:

1. To develop a functional knowledge of the physical and biological processes characterizing freshwater ecosystems and their dynamics.
2. To understand the relationships between freshwater ecosystems and their terrestrial context.
3. To understand the ways in which freshwater ecosystems provide habitat for aquatic organisms.
4. To become familiar with the impacts of various management practices on freshwater ecosystems.
5. To become familiar with various regulatory frameworks for freshwater ecosystems.

Course Curriculum:

1. The variety of freshwater ecosystems.
 - Watersheds and watershed processes.
 - Introduction to hydrology and geomorphology
 - Standing and moving waters.
 - The hierarchy of stream order: physical and biological characteristics
 - Riparian Zones
 - Longitudinal integration in stream and river systems: introduction to the river continuum concept

2. The stream reach and linkages between streams and forests.
3. Introduction to ecological and physical processes in lakes
4. Longitudinal integration of physical and biological processes.
 - The River Continuum
 - Nutrient Spiraling
 - Movement of organisms and physical structures
5. Large rivers floodplains, and estuaries
6. Case studies of organisms:
 - Invertebrates of small streams
 - Invertebrates of large streams and rivers
 - Invertebrates of lakes
 - Anadromous salmonids
 - Resident salmonids
 - Beavers as keystone species in landscape modification
 - Terrestrial organisms which use aquatic ecosystems
7. Linkages among terrestrial, freshwater and marine ecosystems
8. Case Study: effects of forest management on stream systems
 - Hydrological changes
 - Geomorphic changes
 - Stream temperature
 - Large organic debris
 - Effects on fish and fish habitat
9. Other case studies to vary from year to year
 - e.g. effects of fertilizers and toxics in runoff from agriculture
 - e.g. hydroelectric-electric processes
 - e.g. introduced species
 - e.g. acidification
 - e.g. stream rehabilitation
10. Examples of regulatory frameworks for the management and conservation of freshwater ecosystems:
 - Responsible agencies
 - Coastal Fisheries/Forestry Guidelines
 - Tripp Reports
 - Forest Practices Code
 - FEMAT
 - Various riparian management guidelines
 - Watershed assessment procedures

International Joint Commission (Great Lakes)
others to be added as appropriate

11. Wrap up and review.

Reference

Maser, C. and Sedell, J. 1994. The forest to the sea: the ecology of wood in streams, rivers estuaries and oceans. St. Lucie Press. Delray Beach, FL

Hartman, G.F. and J.C. Scrivener. 1993. Impacts of forestry practices on a coastal stream ecosystem, Carnation Creek, British Columbia. Canadian Bulletin of Fisheries and Aquatic Sciences 223/ Department of Fisheries and Oceans.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information School: School of Resource and Environmental Management

Abbreviation Code: REM New Course No: 477 Credit Hours: 3 Vector: 2-0-2

Title of Course: **APPLIED CONSERVATION BIOLOGY**

Calendar description of Course: This course will examine the scientific basis for conservation at the genetic, population, ecosystem, and landscape levels of organization. In the first half the course, students will become familiar with the historical development of the field of conservation biology, its theoretical foundations and its major current areas of research. The second half the course will focus on a number of case studies in conservation science to demonstrate its successes and failures, and to show the interaction how between theory and practice. Applications of conservation biology to ecosystem management will be emphasized.

Nature of Course: Lecture/ Lab/ Field Trips

Prerequisites (or special instructions): REM 100, 200, and 311

What course(s), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? annually

Semester in which the course will first be offered? 1999-3

Which of your present faculty would be available to make the proposed offering possible?

None - new faculty required

3. Objectives of the Course (rationale) Though issues of conservation science are touched on in a variety of other courses, none focus explicitly on its theories, tools, development, and practices. This course will provide the conceptual foundation required to place conservation issues solidly in a scientific context and will fit logically with REM 471 and REM 475 as a course package for students interested in the scientific basis for land management.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty for third year: See attached schedule for new faculty and staff

Staff for third year: See attached schedule for new faculty and staff

Library: Minor new requirements


Audio Visual: None

Space: Computer Lab

Equipment: Computers

5. Approval

Date:

<p><u>May 11, 1996</u></p> <p></p> <hr/>	<p><u>May 11, 1996</u></p> <p><u>Parveen Bawa</u></p> <hr/>	<p>_____</p> <hr/>
Department Chair	Dean	Chair, SCUS

SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT

Bachelor of Resource and Environmental Management (BREM)

REM 477-3

Applied Conservation Biology

This course will examine the scientific basis for conservation at the genetic, population, ecosystem, and landscape levels of organization. In the first half the course, students will become familiar with the historical development of the field of conservation biology, its theoretical foundations and its major current areas of research. The second half the course will focus on a number of case studies in conservation science to demonstrate its successes and failures, and to show the interaction how between theory and practice. Applications of conservation biology to ecosystem management will be emphasized.

Grading Distribution:

Mid Term	25%	Paper	25%
Tutorials	25%	Final Examination	25%

Objectives:

1. To become familiar with the historical development, and philosophical and theoretical foundations of conservation biology as a discipline.
2. To understand the processes leading to vulnerability and viability of populations and communities.
3. To understand the dynamic nature of ecosystems and landscapes and the context this provides for large-scale conservation.
4. To become familiar with the roles, limitations, purpose and methods of science in conservation practice
5. To learn how to approach conservation problems in a scientific context.

Course Curriculum:

1. Introduction: what is conservation biology.
 - Historical and philosophical roots
 - Emergence as a discipline
 - The hierarchy of biological diversity
 - Sample of the range of problems addressed in Conservation Biology
2. The problems of species diversity, extinction and persistence.
 - Patterns of species diversity in space and time
 - Measures of diversity

- Paleo- and modern patterns of species diversity
 - Extinction
 - Refugia
 - Geographic gradients of diversity
 - Short-term fluctuations in diversity: succession and disturbance
 - Human impacts on species diversity
 - Types and causes of rarity
 - Fine-filter conservation strategies
3. The problem of population persistence.
 - Species exist as populations
 - Population viability
 - Metapopulations
 - Sinks and sources
 - Case studies.
 4. The problem of genetic diversity.
 - Measures of genetic diversity.
 - Patterns of genetic diversity.
 - Why is genetic diversity lost?
 - What are the consequences of reduced genetic diversity?
 - Strategies for genetic diversity
 - Case studies.
 5. Conserving dynamic systems.
 - Spatial and temporal scales and context
 - The coarse filter approach
 - Communities as a conservation problem.
 - Ecosystems as a conservation problem.
 - Communities and ecosystems in dynamic landscapes
 - Case studies.
 6. The problem of reserve design.
 - Early approaches and simple models of island biogeography
 - Recent case studies
 7. What is "natural"?
 8. The fragmentation problem.
 9. Conservation and the semi-natural matrix.
 - Landscape processes
 - Interactions between more and less intensively managed areas
 - Case studies

10. Problems in legislating conservation.
11. The problem of unknown species and uncertainty about ecological relationships.
12. Where is conservation science headed?
The paradigm of management and the fallacy of sufficient information
13. Wrap up and review.

Reference:

Primack, R.B. 1993. Essentials of conservation biology. Sinauer Assoc. Inc. Massachusetts.
564 pp.

BREMcrs(May3/96)

Appendix 3
Sequence of Adding MINIMAL HONORS AND MAJORS BREM PROGRAM Courses, Faculty, and Support Staff

Instructors		Sequence of Adding New Faculty to REM					Sequence of Adding Support Staff							
Faculty	REM Course #	Course Name	97-3	98-1	98-2	98-3	99-1	99-2	99-3	2000-1	2000-2	2000-3	2001-1	2001-2
			A - 97-3 - Social Scientist/Planner 1						97-2	New			Undergraduate Program Co-ordinator	
			B - 97-3 - GIS/Scientist I						97-3	New			0.5 Technician	
			C - 99-3 - Social Scientist II						98-3	New			1 Full-time technician	
			D - 99-3 - Social Scientist III						99-2	New			Word Processor/Clerk/receptionist	
			E - 00-3 - Scientist II											
			F - 00-3 - Scientist III											
New	REM		97-3	98-1	98-2	98-3	99-1	99-2	99-3	2000-1	2000-2	2000-3	2001-1	2001-2
REQUIRED TRANSDISCIPLINARY COURSES														
A	REM 100	Global Change	REM	REM		REM	REM		REM	REM		REM	SCIENCE	REM
	REM 200	Environmental Dynamics				SCIENCE	SCIENCE		SCIENCE	SCIENCE		SCIENCE	SCIENCE	
	REM 311	Applied Ecology & Sustainable Environments							SCIENCE	SCIENCE		SCIENCE	SCIENCE	SCIENCE
AD	REM 356	Institutional Arrangements for Sustainable Env. Mgmt.							REM	REM		REM	REM	REM
	GEOG 389	Human Ecology							GEOG/ARTS	GEOG/ARTS		GEOG/ARTS	GEOG/ARTS	GEOG/ARTS
	GEOG 445	Resource Planning							GEOG/ARTS	GEOG/ARTS		GEOG/ARTS	GEOG/ARTS	GEOG/ARTS
	GEOG 450	Sustainable Environmental Management Workshop							GEOG/ARTS	GEOG/ARTS		GEOG/ARTS	GEOG/ARTS	GEOG/ARTS
REQUIRED COURSES														
B	BISC 312	Environmental Toxicology							SCIENCE			SCIENCE		
	REM 320	Introduction to Dynamics & Management of Nat. Res.							REM			REM		
C	342	Principles of Sustainable Environmental Planning & Mgmt.							REM			REM		
C	343	Decision Making in Resource and Environmental Mgmt.								REM			REM	
E	404	Methods and Tools for Resource Planning & Mgmt.								REM			REM	
F	420	Advanced Dynamics, Analysis, & Mgmt. of Natural Resources										REM		
	445	Environmental Risk Assessment & Mgmt. of Hazardous Substances										REM	REM	
	464	Directed St. in Advanced Topics										REM	REM	REM
F	477	Applied Conservation Biology										REM	REM	REM

Sequence of Adding MINIMAL HONORS AND MAJORS BREM PROGRAM Courses, Faculty, and Support Staff

Appendix 3

Course Name	97-3	98-1	98-2	98-3	99-1	99-2	99-3	2000-1	2000-2	2000-3	2001-1	2001-2
Intro to Planning Thought							REM			REM		
Applications of Geographic Information Systems in Resource and Environmental Management							REM			REM		
Applied Watershed Hydrology	REM			REM			REM	REM		REM		
Environmental Conflict & Public Involvement in Decision Making								REM			REM	
Environmental & Resource Law								REM			REM	
Impact Assessment								REM			REM	
Environmental Modelling								REM		REM		
Forest Ecosystem Management										REM		
ELECTIVES WHICH WILL BE AD FOR THE ABOVE ELECTIVE WHEN FACULTY ARE AVAILABLE												
Fisheries Management: An Intro.												
Planning & Management of Protected Areas												
Energy Planning & Management												
Environmental Quality Assessment & Management												
Resource & Environmental Management for First Nations												
Tourism Planning & Management												
Water Planning & Management												
Freshwater Ecosystem Mgmt.												

Appendix 4

BREM Program Budget

**Bachelor of Resource and Environmental
Management Honors and Majors BREM Program**

Budget Implications

The following information is based on

Appendix 3 (Sequence of Adding Courses)

Appendix 4 (Program Budget)

Appendix 5 (Operating, Laboratory, and Field Budget)

**Total Program Budget
(REM)**

Year 1 (1997-98)	\$357,450
Year 2 (1998-99)	\$293,250
Year 3 (1999-00)	\$738,000
Year 4 (2000-2001)	\$716,250

/rk
imp-rem
5/7/96

Appendix 4

**School of Resource and Environmental Management
HONORS AND MAJORS BREM PROGRAM BUDGET
(DOES NOT INCLUDE CO-OP)**

	1997-98	1998-99	1999-00	2000-01
<i>Cumulative Enrollment in BREM¹</i>	50	100	150	200
Total Faculty Complement	120,000.00 ²	120,000.00	245,000.00 ⁸	365,000.00 ¹¹
Teaching Assistants	50,000.00 ³	50,000.00 ⁶	100,000.00 ⁹	160,000.00 ¹²
Support Staff	30,000.00 ⁴	30,000.00	55,000.00 ¹⁰	55,000.00
Technical Support	20,000.00 ⁵	60,000.00 ⁷	60,000.00	60,000.00
Operating Costs	220,000.00	260,000.00	460,000.00	640,000.00
Capital Costs	137,450.00	33,250.00	278,000.00	76,250.00
Total	357,450.00	293,250.00	738,000.00	716,250.00

¹This accounts only for students in the BREM programs. In addition there will be many course openings made available to students from the arts, applied science, business, and science faculties. These will be offered annually and perhaps each semester if warranted by demand.

- 1997-98 ²22 faculty positions
- ³TA funding for REM 100
- ⁴Undergraduate Program Co-ordinator
- ⁵0.5 Technician, to make an existing .5 REM technician a 1.0 technician

- 1998-99 ⁶TA funding for REM 100
- ⁷1.5 Technician, this represents the .5 hired in 97-3 (\$20,000) + 1.0 technician (\$40,000)

- 1999-2000 ⁸Two new faculty and one sessional
- ⁹TA funding for first, second, and third year courses
- ¹⁰Word Processor/Clerk/Receptionist

- 2000-01 ¹¹Two new faculty
- ¹²TA funding for first, second, third, and fourth year courses

Appendix 5
OPERATING, LABORATORY, AND FIELD BUDGET
SCHOOL OF RESOURCE AND ENVIRONMENTAL MANAGEMENT
HONORS AND MAJORS BREM PROGRAM
(DOES NOT INCLUDE CO-OP)

Object	Descriptions	1997-98 ¹	1998-99 ²	1999-00 ³	2000-01 ⁴
5582	Honoraria	500.00	500.00	1,500.00	1,500.00
6111	General Travel	500.00	500.00	1,000.00	1,500.00
6112	Field Travel			2,000.00	3,000.00
6151	Invited Speaker Travel			300.00	300.00
6311	Mag. & Books (Library)	1,000.00	500.00	3,500.00	2,000.00
6312	Mat. & Supplies	1,500.00	1,000.00	10,000.00	3,000.00
6314	Software	10,000.00	2,500.00	10,000.00	2,500.00
6315	Advertising	3,000.00	3,000.00	3,000.00	3,000.00
6319	General Office	3,000.00	3,000.00	4,000.00	5,000.00
6321	Long Distance Telephone	2,000.00	2,000.00	3,000.00	4,000.00
6323	Facsimile Expense	200.00	200.00	400.00	600.00
6331	Postage	2,000.00	2,000.00	3,000.00	4,000.00
6334	Courier	200.00	200.00	400.00	600.00
6341	Printing/Photocopying	2,000.00	2,000.00	3,000.00	4,000.00
6391	Special Dept. Requirements	500.00	500.00	500.00	500.00
6551	Maint. of Equipment	5,000.00	5,000.00	20,000.00	20,000.00
6562	IMC Work Orders	500.00	500.00	1,000.00	1,000.00
6611	Equipment Purchases	100,000.00	5,000.00	200,000.00	10,000.00
6691	Freight	50.00	50.00	150.00	150.00
6692	Customs/Duty/Taxes	300.00	100.00	500.00	100.00
6711	Terminal Line Rentals	1,200.00	1,200.00	2,500.00	3,500.00
6729	Equip. Lease Rentals				
6851	Telephone Service	2,000.00	2,500.00	3,250.00	4,000.00
6911	Repairs & Alterations	2,000.00	1,000.00	5,000.00	2,000.00
	TOTAL	137,450.00	33,250.00	278,000.00	76,250.00

- 1 2 faculty, 1 undergraduate program co-ordinator, 0.5 technician, GIS lab, and start up costs
- 2 1 full time technician
- 3 add 2 more faculty, 1 more support staff, project rooms, teaching/computer lab, natural resource lab
- 4 add 2 more faculty
all four years of classes offered.

appen4&5
5/7/96

Appendix 6

BREM Space Needs

Table 2

LABORATORIES REQUIRED

A	NATURAL RESOURCE	1800 sq. ft.
B	COMPUTER	1800 sq. ft.
C	GIS	1800 sq. ft.
D	PROJECT ROOMS	600 sq. ft. x 3

UNDERGRADUATE

COURSE	TITLE	TYPE OF LAB
REM 303	Introduction to Planning Thought	D
REM 311	Applied Ecology and Sustainable Environments	B
REM 320	Introduction to Natural Resource Dynamics, Analysis, and Management	A
REM 330	Applications of Geographic Information systems in Resource and Environmental Management	C
REM 331	Applied Watershed Hydrology	A
REM 340	Environmental Conflict and Public Involvement in Decision Making	D
REM 342	Principles of Sustainable Environmental Planning and Management	D
REM 343	Decision Making in Resource and Environmental Management	D
REM 346	Impact Assessment	D
REM 404	Methods and Tools for Resource Planning and Management	B
REM 412	Environmental Modeling	B
REM 420	Advanced Dynamics, Analysis and Management of Natural Resources	A
REM 445	Environmental Risk Assessment and Management of Hazardous Substances	B
REM 471	Forest Ecosystem Management	A
REM 477	Applied Conservation Biology	A

/rk
5/7/96
ENPLAB2

BREM Space Needs - 1996-97 to 2000-01

1997-98

- a. Two new faculty to teach undergraduate courses.
- b. New faculty research associates or assistants.
- c. REM General Office area for the first undergraduate support staff person.
- d. Our most urgent laboratory need is for a GIS laboratory (table 2)
- e. REM 100 course requires four teaching assistants.

1998-99

- a. A technician's office to accommodate the increased workload on faculty, staff, and students.

1999-2000

- a. Two REM faculty offices
- b. Two research associate or assistant offices.
- c. An additional undergraduate staff person.
- d. Natural resources laboratory with water and good air circulation for undergraduate and graduate courses (table 2)
- e. One open laboratory for undergraduate counseling.
- e. One TA facility.
- f. Undergraduate project room (table 2)

2000-01

- a. Two REM faculty offices.
- b. Two research associate or assistant offices.
- c. Undergraduate project room (table 2)

2001-02

- a. None at this time.

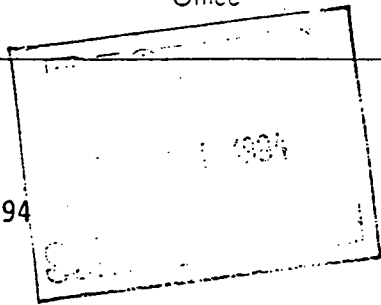
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5/7/96
enplspa



Province of
British Columbia

Land
Use
Coordination
Office

Market Square
229-560 Johnson Street
Victoria
British Columbia
V8W 3C6
Fax: (604) 953-3481



November 16, 1994

Dr. J. Chadwick Day
Simon Fraser University
Director of School of Resource
and Environmental Management
Faculty of Applied Sciences
Burnaby BC V5A 1S6

Dear Dr. ~~Day~~ *Chad.*

I want to thank you, for the opportunity to provide my comments on the proposed undergraduate proposal for a BSc in Environmental Planning and Management (BSCENPL). I am impressed with the quality of your proposal and appreciate the leadership role taken by Simon Fraser University in proposing this program.

In particular, the objectives set out for the BSc in Environmental Planning and Management is to be commended. Government and Industry will require these new kind of managers to meet the emerging provincial, national and global challenges in the field of sustainable environmental management. As you indicate in your outline the sustainable management of natural resources and the environment requires interdisciplinary skills and an appreciation of the principles and research findings in related fields.

I want to take this opportunity to provide my support for your proposal and look forward to hearing a positive outcome.

Yours sincerely,

Dereck Thompson
Assistant Deputy Minister

P.S. Needless to say we will provide our support to you, should you wish, as you develop this program

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Province of
British Columbia

OFFICE OF THE ASSISTANT
DEPUTY MINISTER
REGIONAL OPERATIONS
AND ENFORCEMENT DEPARTMENT

Ministry of
Environment,
Lands and Parks

Parliament Buildings
Victoria
British Columbia
V8V 1X5

October 21, 1994

Dr J Chadwick Day
Simon Fraser University
Director of School of Resource and
Environmental Management
Faculty of Applied Sciences
Burnaby BC V5A 1S6

Dear Dr J Chadwick Day:

Thank you, for the opportunity to review the proposed undergraduate program proposal for a BSc. in Environmental Planning and Management (BScENPL) being considered by Simon Fraser University. I am very impressed with the material you provided for my review and comment.

I congratulate you and your colleagues for the multi-disciplinary approach this program takes through the diversity in the curriculum and in the faculty background. The objectives you have proposed for the program to train a new kind of manager to meet the emerging, provincial and national and global challenges in the field of a sustainable environment is to be commended. Simon Fraser University and in particular the School of Resource and Environmental Management is leading the way by ensuring that British Columbia has future qualified managers with the knowledge, skills and abilities to meet the 21st century.

I wish you every success in going forward with this proposal and look forward to seeing this program offered by Simon Fraser University in the near future.

Yours sincerely,

J. O'Riordan

Dr. Jon O'Riordan
Assistant Deputy Minister
BC Environment Regional Operations

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Memo:

To: Dr. Chad Day, Director, School of Resource & Environmental Management

From: Doreen Godwin, Director, Co-operative Education

Date: August 22, 1994

Subject: REM Sub-Committee Report

Enclosed is the report from the Co-op Advisory Council REM Sub-committee and three letters from specific companies.

As the report indicates, the response is very favourable.

I know the committee spent a significant amount of time. I hope their support will be helpful.

Please keep me informed of the progress in the establishment of the Undergraduate Program. If there is anything the Council or Co-op can do for you, let me know.

Thanks again for your participation.

Doreen Godwin

Doreen Godwin

DG/pes

encl.

SFU CO-OP ADVISORY COUNCIL

REM SUB-COMMITTEE REPORT

Purpose:

The REM Sub-Committee was formed at the last Co-op Advisory Board meeting following a presentation by Dr. Chad Day describing the current REM (Resource and Environmental Management) graduate program and informing us of SCAP approval of a proposal for an undergrad program. Dr. Day is interested in the Board's views regarding the future employability of a graduate from the program as well as our views on the applicability of the skills and knowledge gained to various industries and in general.

In the course of several telephone calls and a meeting of the sub-committee, it was decided that the most appropriate way to address the issue would be to present a general view, together with views from three industry groups, as developed at a recent meeting, to the Board at its May 31, 1994 meeting. At this meeting, further views from Board members from other industries would be solicited. Those members whose views are thought to have particular applicability would be asked to write a brief memo on the topic with the whole put together as a completed report to Dr. Day.

It is anticipated that Dr. Day may use this material as part of his submission for funding to start the undergraduate program.

General View:

The sub-committee was of the general view that the program had considerable merit. In particular, the breadth of the program, including economics, planning, business, law and political studies was seen as useful adjuncts to what has traditionally been as scientific curriculum. With the spread of environmental legislation and regulation into all corners of the business world, the need for a more general approach was noted. Further, the ability to communicate with non scientific communities is becoming essential.

A number of general trends which will influence the employment market for graduates of the proposed program are evident.

First, the onus of environmental responsibility is being put on industry and manufacturers by the public through legislation. The result is that industry is focused on working within ever shrinking boundaries of flexibility and increasing regulatory complexity. Further, long-term business decisions are made more difficult by the potential for changes in environmental legislation. From an employment perspective, the result is that the environmental responsibility group of a large manufacturer must have a high level of knowledge and skill in understanding, negotiating and managing the legislative and regulatory process. The group leaders are often drawn from senior levels of government. A large manufacturer will also have scientists and communicators on this staff.

Secondly, the environmental movement is a highly emotional topic with the public and yet is one where an informed grasp of the issues is nearly beyond the grasp of the average citizen. Further, passionate advocates of various environmental causes take advantage of the emotionality and lack of full understanding by the public through sophisticated media and PR campaigns to further their ends. As industry is inevitably the target of these campaigns, it has the difficult task of trying to foster a reasonable and balanced approach using facts and logic while the opponents are not similarly constrained.

Thus, a further general need of industry is to have a high level of communication and public relations skills in the environmental responsibility group. While this skill may be contracted out, a focus on the public relations aspect of environmental activities is essential.

Thirdly, with shrinking government budgets in the future, as a practical matter, the method of achieving environmental responsibility will be through legislation and industry self-regulation. Tough penalties for infractions will form the incentive to comply and spot checks by independent consultants to government will be the audit process. In B.C.'s largest industries, forestry and mining, these procedures are already in place. From an employment perspective, this means that the large majority of jobs in the future will be in the consulting field. Consulting firms will work for industry and government, providing a regular audit, forecast and planning function for the former, and compliance audit and public policy analysis for the latter. Consulting is dealt with specifically below; however, as a general matter with regard to the proposed REM undergraduate program, it should be noted that, for a variety of reasons, not the least of which is market demand, consulting firms usually require that the senior consultants have post graduate degrees. There will certainly be jobs for B.Sc.'s from REM but these would likely be at an associate level.

Lastly, the sub-committee felt that the REM undergraduate program would be an excellent precursor to a wide variety of post graduate degrees. Most notable of these would be a REM-Law or REM-MBA combination. Individuals with these degrees would have a broad field of opportunity in many industries. In addition, an REM degree coupled with a post graduate degree in economics or public policy would be appropriate to a senior career in government. Finally, the REM followed by further specialization in one of the environmental fields would provide both the post graduate level scientific training and the broader business and public policy perspective considered desirable for many consulting applications.

In examining the curriculum in detail, the sub-committee was of the view that it generally has achieved the difficult task of balancing a sufficient scientific background with the business, communications and public policy skills needed. Nevertheless, given the above, it is the sub-committee's suggestion that further emphasis could be placed on the following:

- a few practical business courses, particularly in project risk and return analysis and corporate strategy
- law and legislation

- public relations and communications, and media relations.

Specific Industry Views:

Banking

In general, the effects of environmental legislation on Banks are legal and risk related. The most common problem is that under current legislation, Banks become responsible for cleaning up property which they have taken as security for a loan in the event of foreclosure. These costs can often reduce the value of the property as security to nil (or worse). The Banks now routinely perform an environmental audit on properties offered as security for any sizable loan and refusal to make the loan or requiring other security is common. Generally, the Banks contract out these audits because they want to be able to recover costs from an independent source if the audit is wrong. Some Banks have recently hired a few environmental audit specialists. As property is the issue, the specialties involved are usually in the soil contamination field.

In addition to security issues, the Banks must also determine the current and future risks of environmental legislation, permitting and regulation on the business viability and debt service capability of its customers. On large loans, or in instances where the regulations are particularly acute, the Banks may require a review of the situation from a consultant.

Other environmental issues affecting the Banks are paper recycling, working environment and ergonomics, and, as large employers and corporate citizens, leadership roles in environmental issues.

In summary, I do not see Banks as large employers of REM students for specific environmental posts; however, they will be major generators of business for consultants. In addition, I believe they will see REM grads as more than acceptable candidates for general employment, especially in the lending business.

Forestry Products

General: From a macro point of view, I see a current and growing need for this type of undergraduate program. It is expected that the current focus on the environment will continue, if not escalate. The demand will come from both the public and private sectors. It is quite likely this will cause significant growth in the environmental consulting industry. One might question what academic disciplines will be required and what level of specialization.

Forest Industry: From a forest industry perspective, one might see two broad areas of opportunity:

1) Operational

- woodlands management and planning
- manufacturing - both pulp & paper, and solid/composite wood

2) Staff

- forest related planning and government relations
- communications and public relations
- corporate environmental department

Curriculum: From an industry point of view, it is likely graduates would have to acquire "professional accreditation", i.e. an RPF designation. Therefore, it would be desirable to contact the various professional associations to determine the compatibility of the course content.

Other suggestions:

Business Economics: develop an understanding of costs/benefits to present a balanced view.

Marketing: to prepare the graduates to promote themselves, their ideas, and their employers.

International: provide a broader perspective.

Consulting

I am making my comments from the perspective of a private sector small business environmental consultant employer with the following breakdown of present staff:

Ph.D. level biologists	3
M.Sc. level biologists	6
M.Sc. level chemist	1
Masters level engineer	1
MBA/biologist	1
B.Sc. level biologist	1
Tech. school level res. management technicians	3

Although our staff makeup does reflect our niche in the present environmental consulting market, the skewing of staff backgrounds toward post graduate training is generally predominant in our industry. Since our type of small business is likely to be a major employer of new graduates in the future, it may be beneficial to take our experience into account.

The preference in training for our staff, I believe, is because of the following:

1. Post graduate qualifications of staff are more marketable in domestic and especially our international market.
2. Post graduate trained staff generally have learned to write. B.Sc. level people often cannot. Since we are paid on the basis of the reports we produce, this skill is essential.
3. Post graduate staff usually have the experience of planning and producing a thesis, an exercise closely related to producing reports for our clients (although we cover similar ground in much less time).

We do not, therefore, at the present time hire many undergraduate university staff full-time, although we do hire twelve undergraduate Co-op students per year in technician roles.

However, having reviewed the above, we think the ENPL program proposed would be a very positive development. In fact, one of our Ph.D. staff's comments was *"Looks like an excellent program with a good blend of theoretical and practical courses, etc. If I was a starting undergraduate student, I would want to enroll!"*

We would like to see enhancement of the program in the following areas:

1. Provision of courses to ensure solid writing abilities even at the ENPL level (i.e., computers cannot write alone - yet).
2. Provision of a requirement or possible option for a graduating thesis (such as that required for some undergraduate honours courses).
3. Exposure to some marketing concepts since in small businesses every employee must be at least partly able to market the services of the company.
4. More specific coverage of international environmental and resource management topics such as biodiversity, global warming, coastal resource planning, rainforest management, etc. Since the market for environmental services and jobs in future will be much larger outside of Canada, state-of-the-art in these areas must be covered.
5. Concepts of working together in interdisciplinary, intercompany/interinstitutional, interracial/cultural, etc. terms should be imparted (i.e. it is one thing to know the theory of carrying out international environmental work, it is quite another to do it).
6. Insurance that the ENPL program would fit well as a strong basis for a number of post graduate degree programs.

Conclusion

The sub-committee believes that the REM program is timely and contains studies which are desired by many industries. Different industries may seek specialization in their area of interest, but all agree that a broad approach has considerable merit. We encourage Dr. Day to pursue the implementation of his program.

Respectfully submitted,

Peter Scott

Bill Adams

Chris Hatfield

Gail P. Sexsmith
Vice-President
Human Resources

24 June 1994

Ms. Doreen Godwin
Simon Fraser University Co-p Program
Burnaby, BC
V5A 1S6

Dear Doreen,

Thank you for the opportunity to provide input on the new program in the School of Resource and Environmental Management. Our Environmental Affairs department reviewed the material and we offer the following comments for your consideration.

We highly value the excellent, multi-disciplinary approach that the program takes through the diversity in the curriculum outline and the faculty background.

The goals of the school, such as "extend the frontiers of fundamental knowledge" and "make the resulting benefits available to society", are admirable. More information about the school's implementation plan for achieving these goals is needed before we can provide useful comment.

The concept of completing the degree and entering an apprenticeship program is excellent. However, the degree appears to be generalist and broad-based. Is it possible for graduates to have options and choose from other professional designations in addition to planning?

We offer two comments regarding the curriculum outline. At first glance, there appear to be several 100 level courses. Secondly, we suggest that courses in project management and business writing be included in order to fully prepare students for their professional career.

Thanks again for this opportunity to comment - I hope our input is useful. My best wishes for success with the new program!

Yours truly



Gail Sexsmith

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THE CALDWELL PARTNERS
AMROP INTERNATIONAL

999 West Hastings Street, Suite 750, Vancouver, Canada V6C 2W2
Tel. 604.669.3550 Fax 604.669.5095

June 8, 1994

STRICTLY PRIVATE

Ms. Doreen Godwin
Director, Cooperative Education
Simon Fraser University
3rd Floor, Administration Building
Burnaby, British Columbia
V5A 1S6

Dear Doreen:

Re: REM Sub-Committee Report

At the meeting last week you asked for comments from Committee members relative to the excellent Report submitted by the above Committee.

The only comment which I feel should be included is based on the feeling that in order to succeed in business today, international business experience is highly advantageous. Therefore I would like to see, as an Option, the inclusion of a course which outlines, expands and/or details the ethics and social customs of nations internationally. This, in fact, might only be a two or three week course, but I feel it would tend to enhance the interest and knowledge of those students who are interested in international.

I also feel that a second language is absolutely essential! ... particularly with Asian Pacific influence in business. Clients for whom we are recruiting demand not only the technical skills but state a preference for those individuals with Cantonese, Mandarin, Urdu etc. Any second language is highly advantageous particularly to those individuals who end-up in a Consultancy type of role.

I think that Pete, Bill and Chris performed admirably in putting forth their Report and the above is the only suggestion I would have to add

Warm regards.

Yours very truly,

CLARKE H. JACKSON
PARTNER

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HATFIELD CONSULTANTS LTD.

#201 - 1571 Bellevue Avenue
West Vancouver, B.C.
Canada V7V 3R6

Telephone: (604) 926-3261
Fax: (604) 926-5389
E-Mail: 73160,1561 (Compuserve)

To: Ms. Pat Schindel
Fax: 291-4929

From: Chris Hatfield
Reference: 100

Date: May 27, 1994

Pages including cover: 3

Dear Ms. Schindel:

Doreen suggested we fax to you our brief comments on the proposed SFU resources and environment program. I am making my comments from the perspective of a private sector small business environmental consultant employer with the following breakdown of present staff:

1. Ph.D. level biologists	3
2. M.Sc. level biologists	6
3. MSc. level chemist	1
4. Masters level engineer	1
5. MBA/biologist	1
6. B.Sc. level biologist	1
7. Tech school level resources management technicians	3

Although our staff makeup does reflect our niche in the present environmental consulting market, the skewing of staff backgrounds toward post graduate training is generally predominant in our industry. Since our type of small business is likely to be a major employer of new graduates in the future, it may be beneficial to take our experience into account.

The preference in training for our staff, I believe, is because of the following:

1. Post graduate qualifications of staff are more marketable in domestic and especially our international market.
2. Post graduate trained staff generally have learned to write. B.Sc. level people often cannot. Since we are paid on the basis of the reports we produce, this skill is essential.

* Vancouver * Jakarta * Bangkok * Santiago

3. Post graduate staff usually have the experience of planning and producing a thesis, an exercise closely related to producing reports for our clients (although we cover similar ground in much less time).

We do not therefore at the present time hire many undergraduate university staff full time although we do hire twelve undergraduate co-op students per year in technician roles.

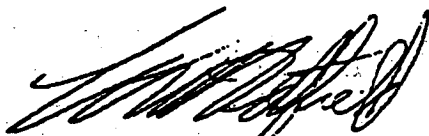
However, having reviewed the above, we think the ENPL program being proposed would be a very positive development. In fact, one of our Ph.D. staffs' comments was, *"Looks like an excellent program with a good blend of theoretical and practical courses etc. If I was a starting undergraduate student, I would want to enroll!"*

We would like to see enhancement of the program in the following areas:

1. Provision of courses to ensure solid writing abilities even at the ENPL level (i.e., computers cannot write alone - yet).
2. Provision of a requirement or possibly option for a graduating thesis (such as that required for some undergraduate honours courses).
3. Exposure to some marketing concepts since in small businesses every employee must be at least partly able to market the services of the company.
4. More specific coverage of international environmental and resource management topics such as biodiversity, global warming, coastal resource planning, rainforest management, etc. Since the market for environmental services and jobs in future will be much larger outside of Canada, state-of-the-art in these areas must be covered.
5. Concepts of working together in interdisciplinary, intercompany/institutional, interracial/ cultural, etc. terms should be imparted (i.e., it is one thing to know the theory of carrying out international environmental work, it is quite another to do it).
6. Insurance that the ENPL program would fit well as a strong basis for a number of post graduate degree programs.

Let us know if we can assist further.

Yours truly,



Christopher T. Hatfield
President
HATFIELD CONSULTANTS LTD.

CTH/vlg

THAILAND - CANADA EIA HRD PROJECT			
DELIVERABLE #	DELIVERABLE TITLE	YEAR	QUARTER
1	Establish Linkages, Identify Relevant Cultural Issues & Initiate Needs Assessment	1	1
2	Identify and Train Level 1 & 2 "Experts" and Develop Level 1 Course Materials	1	1 - 2
3	"Select" (25) Thai Participants, Deliver Level 1 Seminar, Select and Train (8) Thai Trainers and Translate Course Materials	1	3 - 4
4	Thai Trainers Present Level 1 Seminar (1 in Year 1)	1	4
5	Thai Trainers Present Level 1 Seminar (4 in Year 2)	2	5 - 8
6	Develop Course Materials for Level 2 Seminar	1	4
		2	5
7	"Select" Thai Participants (25), Deliver Level 2 Seminar in Thailand, Select & Train (8) Thai Trainers and Translate Course Materials	1	4
		2	5 - 6
8	Thai Trainers Present Level 2 Seminars (2 in Year 2)	2	5 - 8
9	Thai Trainers Present Level 1 & 2 Seminars (6 of each in Year 3)	3	-
10	Thai Trainers Present Level 2 Seminars (2 in Year 4)	4	-
11	Thai Trainers Present Level 1 Seminar (6 in Year 3) Evaluate Level 1 & 2 Thai Trainers and Course Materials and Make Appropriate Adjustments - Year 1 & 2	1	4
		2	6 & 8
12	Thai Trainers Present Level 1 Seminar (2 in Year 4) Evaluate Level 1 & 2 Thai Trainers and Course Materials and Make Appropriate Adjustments - Year 3 & 4	3 - 4	-
13	Identify (8) Appropriate Level 3 Seminars and Relevant Experts, Train the Experts and Develop Course Materials for First 2 Seminars	2	7 - 8
14	Develop Course Materials for 6 Remaining Level 3 Seminars	3	-
15	"Select" Thai Participants, Deliver First 2 Level 3 Seminars in Thailand, Select & Train (4) Thai Trainers & Translate Course Materials	2	8
16	"Select" Thai Participants, Deliver Remaining 6 Level 3 Seminars in Thailand, Select & Train (12) Thai Trainers & Translate Course Materials	3	-
17	Thai Trainers Present 2 Level 3 Seminars in Year 3	2	8
18	Thai Trainers Present 26 Level 3 Seminars in Year 3	3	-
19	Thai Trainers Present 16 Level 3 Seminars in Year 4	4	-
20	Evaluate Thai Trainers and Level 3 Course Material and Make Appropriate Adjustments - Year 2	2	8
21	Evaluate Thai Trainers and Level 3 Course Material and Make Appropriate Adjustments - Year 3	3	-
22	Evaluate Thai Trainers and Level 3 Course Material and Make Appropriate Adjustments - Year 4	4	-

Note: Deliverables broken down by quarter for first two years only.

Appendix 8

BREM Program Library Support

MEMORANDUM

W.A.C. Bennett Library, Simon Fraser University
Burnaby, British Columbia, Canada V5A 1S6

Date: 10 November, 1994

From: Ralph Stanton (Collections Librarian)

To: Dr. Chad Day, School of Resource and Environmental
Management

Re: Bachelor of Science Programme in Environmental
Planning and Management, Library Assessment

Enrollments

This programme offers a Bachelor of Science degree and will start beginning in the fall of 1995. Admissions for the first year will be 25 students followed by another 25 in the second, 50 in the third and 50 in the fourth. The total enrollment at the end of the fourth year should be 150 students. The Programme is expected to be very well enrolled.

Courses

The programme offers 32 courses, 7 are transdisciplinary and will enroll up to 150-200 students per offering and may be offered up to once a semester. 6 are described as specialist and will enroll a minimum of 25 students and will be offered once a year. 9 are optional courses with an enrollment of less than 15 per offering. 10 are specialization courses with an enrollment of less than 15 per offering.

Programme Assessment Method

Due to the large number of courses we did not attempt a course by course assessment but rather developed a list of subject headings based on the reading lists. We then compared our holdings to UBC library using a list of Library of Congress call numbers equivalent to the selected subject headings. For the most part the comparison was not useful since the UBC records are contaminated with records from Microlog (a source which we have but which is not included in our catalogue records). Therefore, the comparison is not presented although gaps indicated were considered when investigating profile gaps. The same list of subject

headings was very useful when it came to developing a list of gap titles on the AMIGOS collection development system.

We also checked the reading lists (November 94) to determine what titles were missing from the collection and which titles required added copies. The School was very helpful in providing lists of required journals and suggesting addition readings.

LC Call Number Gaps

Using the Amigos collection development disk we compared our holdings to our peer group in selected LC class numbers. Lists of the gap books were sent to the Department for selection. The subject headings for the larger gaps were compared to the BNA Thesaurus to determine if there were and holes in the collection profile. A number were found and are listed on page 11 of this report.

	GAP
GB671 (Water Supply)	1
GE105 (Environmental Sciences)	3
GF41 (Human Ecology)	8
GF50 " "	22
GF75-GF80 (Man Influence on Nature)	27
HB849.4 (Population Policy)	9
HC120 (Offenses Against the Environment)	8
HD42 (Conflict Management)	13
HD62 (Social Sciences Research)	2
HD75.6 (Econ. Dev. Environ. Aspects, Green Movement)	37
HD87.5 (Planning History)	5
HD1415 (Food Supply)	8
HD1691 (Water Resources Development)	5
HD1696 (Water Diversion Canada)	2
HD9018 (Food Supply)	12
HD9502 (Energy Policy Environmental Aspects)	13
HM73 (Human Ecology)	15
HN90 (Population Policy)	5
HT166 (City Planning Environmental Aspects)	24
JA75.8 (Green Movement)	5
JX4150 (International Rivers)	1
JX4473 (Conflict Management)	9
KF3816 (Hazardous Wastes)	1
Q181 (Ecology)	32
Q175 (Experimental Design)	56
QC912.3 (Greenhouse Effect)	15
QC981.8 (Climatic Changes)	76
QH77 (Wilderness Areas Canada)	3
QH91.5 (Marine Ecology)	7
QH541 - QH541.5 (Ecology, Forest Ecology, Ecological Simulation Methods, Marine Ecology)	158
RA565-569.8 (Environmental Health)	61

SD387 (Forest Ecology)	11
SH157.8 (Fish Habitat Improvement)	4
SH177 (Stream Biology)	4
SH223 (Fish Populations)	7
SH327-333 (Fishery Management)	10
TC405-409 (Water Res. Development, International Rivers)	18
TD170-170.3 (Environmental Protection)	37
TD171.5 (Env. Law Canada)	2
TD194-195.5 (Env. Impact Anal., Tourist Trade-Env.Asp.)	49
TD345 (Water Supply)	5
TD883-883.7 (Air-Pollution)	20
TD885-890 (Air Poll. Measurement, Air Pollution)	41
TD1030 (Hazardous Wastes)	13
TJ163.2-163.3 (Energy Conservation)	17

Gap titles	881

The Department reviewed these 881 titles and selected 209 as being important to add to the collection. We estimate that half of these titles will be in print at the time of ordering. The cost of 104 titles is \$9,880.

Book Costs

The average price of books in these fields is \$95 per title (BNA Approval Program Coverage and Cost Study 1993-1994).

Added Copies

Since the institution of Library fines it is the policy of the Library to pay for added copies identified on course reading lists and required as a result of course assessments. We have identified 56 such titles from the reading lists which the Library will purchase fines money at a cost of \$5,320.

Serials

The Department identified the follow serials as not present in the collection and wanted for the Programme:

Coastal Management	\$ 213
Ecological Economics	\$ 685
Environmental Monitoring and Assessment	\$1108
Environmental Toxicology and Chemistry	\$ 749
Journal of Risk and Uncertainty	\$ 415
Journal of Vegetation Science	\$ 474
Landscape Ecology	\$ 248
Marine Mammal Science	\$ 155
Natural Areas Journal	\$ 84

Total \$4131

From the reading lists we identified the following journals which should be added:

Coastal Zone Management	\$ 549
Ecography (was Holarctic Ecology)	\$ 169
Forest Planning Canada	\$ 43
Hydata	\$ 54
Impact Assessment	\$ 83
Landscape ecology	\$ 248
Natural Areas Journal	\$ 83
Water Resource Management	\$ 261
Western Wildlands	\$ 29

	\$1,519
Journal costs	\$4,131
	\$1,519

Total Journal Costs	\$5,650

Course by Course Summary

ENPL 100-3 Global Change

There are 14 items on the reading list of which 4 are not in the collection and should be purchased at a cost of \$380.

ENPL 200-3 Environmental Dynamics

The one text for this course is in the Library but a added copy should be purchased at a cost to the Library of \$95.

ENPL 301-3 Introduction to Planning Thought

The one text for this course is in the Library but a added copy should be purchased at a cost to the Library of \$95.

ENPL 302-3 Methods and Tools for Resource Planning and Management

There are 6 items on the reading list of which 1 is not in the collection and should be purchased at a cost of \$95. There was evidence of high use on a further 2 items which will be duplicated by the library at an estimated cost of \$190.

ENPL 311-3 Sustainable Environments : Applied Ecology

There are 70 monograph items on the reading list of which 22 are not in the collection and should be purchased at a cost of \$2090. There was evidence of high use on a further 9 items which will be duplicated by the library at an estimated cost of \$855.

There are 90 serial items on the reading list of which 14 are missing from the collection (see separate section on serials).

ENPL 311-3 Fisheries Management : An Introduction

There are 16 monograph items on the reading list of which 1 is not in the collection and should be purchased at a cost of \$95. There was evidence of high use on 1 further item which will be duplicated by the library at an estimated cost of \$95.

There are 5 serial citations on the reading list of which 1 is missing from the collection (see separate section on serials).

ENPL 316-3 Human Ecology

There are 4 monograph items on the reading list of which 2 are not in the collection and should be purchased at a cost of \$190.

ENPL 330-3 Applications of Geographic Information Systems in Resource and Environmental Management

There is 1 text which is not in the collection and should be purchased for \$95. An added copy should be purchased at a cost of \$95 to the Library.

ENPL 331-3 Applied Watershed Hydrology

There are 3 monograph items on the reading list of which 1 is not in the collection and should be purchased at a cost of \$95.

ENPL 340-3 Environmental Conflict and Public Involvement in Decision Making

There is 2 texts cited of which 1 is not in the collection and should be purchased at a cost of \$95.

ENPL 341-3 Environmental and Resource Law

There are 4 monograph items on the reading list of which 1 is not in the collection and should be purchased at a cost of \$95. One additional item should be duplicated at a cost to the Library of \$95.

ENPL 342-3 Planning for Sustainability

There are 4 monograph items on the reading list of which 1 is not in the collection and should be purchased at a cost of \$95. One additional item should be duplicated at a cost to the Library of \$95.

ENPL 343-3 Environmental Planning in Urban Regions

There is 1 monograph listed which is in the Library with three copies present.

ENPL 346-3 Impact Assessment

There are 28 monograph items on the reading list of which 5 are not in the collection and should be purchased at a cost of \$475. There was evidence of high use on 3 further items which will be duplicated by the library at an estimated cost of \$285.

There are 7 serial citations on the reading list of which 2 are missing from the collection (see separate section on serials).

ENPL 347-3 Planning and Management of Protected Areas

There are 7 monograph items on the reading list of which all are in the collection. Five of the items show signs of high use and should be duplicated at a cost to the Library of \$475.

ENPL 350-3 Energy Planning and Management

There are 29 monograph items on the reading list of which 18 are not in the collection and should be purchased at a cost of \$1710. There was evidence of high use on 2 further items which will be duplicated by the library at an estimated cost of \$190.

There are 15 serial citations on the reading list all are from journals present in the collection.

ENPL 356-3 Institutions for Sustainable Environmental Management

There are 24 monograph items on the reading list of which 11 are not in the collection and should be purchased at a cost of \$1045. There was evidence of high use on 5 further items which will be duplicated by the library at an estimated cost of \$475.

There is 1 serial citation on the reading which is from a journal in the collection.

ENPL 402-3 Sustainable Environmental Management Workshop

There are no texts or journals listed for this course.

ENPL 410-3 Water and Air Quality Monitoring and Management

There are 5 monograph items on the reading list of which 4 are not in the collection and should be purchased at a cost of \$380.

There is 1 serial citation on the reading which is from a journal which is not in the collection (see separate section on serials).

ENPL 411-3 Water Quality Monitoring : Laboratory and Field Testing

There are 2 monographs on the reading list neither are in the collection and should be purchased at a cost of \$190.

ENPL 412-3 Environmental Modeling

There are 3 monograph items on the reading list of which 1 is not in the collection and should be purchased at a cost of \$95. There was evidence of high use of one item which will be duplicated by the library at a cost of \$95.

ENPL 413-3 Advanced Fisheries Management

There are 20 monograph items on the reading list of which 5 are not in the collection and should be purchased at a cost of \$475. There was evidence of high use on 1 further item

which will be duplicated by the library at an estimated cost of \$95.

ENPL 414-3 Solid and Hazardous Waste Management

There is 1 monograph text listed which is not in the collection and should be purchased at a cost of \$95.

ENPL 415-3 Air Quality Monitoring : Laboratory and Field Testing

There is 1 monograph text listed which is not in the collection and should be purchased at a cost of \$95.

ENPL 442-3 Resource Planning

This course is currently offered as a Geography course.

ENPL 443-3 Decision Making in Resource and Environmental Management

There are 11 monograph items on the reading list none are absent from the collection.

The one journal cited is also in the collection.

ENPL 445-4 Environmental Risk Assessment and Management of Hazardous Substances

There are 2 monograph items on the reading list both are not in the collection and should be purchased at a cost of \$190.

ENPL 448-3 Tourism Planning and Management

There are 9 monograph items on the reading list of which 2 are not in the collection and should be purchased at a cost of \$190. There was evidence of high use on 3 items which will be duplicated by the library at an estimated cost of \$285.

There is 1 serial citation on the reading which is from a journal which is not in the collection (see separate section on serials).

ENPL 455-3 Water Planning and Management

There are 30 monograph items on the reading list of which 14 are not in the collection and should be purchased at a cost of \$1330. There was evidence of high use on 3 further items which will be duplicated by the library at an estimated cost of \$285.

There are 14 serial citations on the reading list of which 7 are from journals which are not in the collection (see separate section on serials).

ENPL 471-3 Forest Ecosystem Management

There are 63 monograph items on the reading list of which 20 are not in the collection and should be purchased at a cost of \$1900. There was evidence of high use on 14 further items which will be duplicated by the library at an estimated cost of \$1330.

There are 79 serial citations on the reading list of which 24 are from journals which are not in the collection (see separate section on serials).

ENPL 475-3 Freshwater Ecosystem Management

There are 2 monograph items on the reading list both are in the collection.

ENPL 477-3 Conservation Biology

There is 1 monograph text listed which has evidence of high use and which will be duplicated by the library at an estimated cost of \$95.

121 Monographs identified from reading list cost \$11,495

Cost Summary for B.Sc. in Environmental Planning and Management

ONE TIME COSTS:

121 Monographs from reading lists	\$11,495	
56 Added copy monographs	[\$ 5,320]	LIBRARY COST
104 Monographs from Amigos gap lists	\$ 9,880	
---	-----	
281 New and added titles	\$21,375	one time cost

The Department may wish to discuss the purchase of these resources over a 3 or 4 year period which corresponds with

the period of implementation of the programme.

RECURRING COSTS:

Serials additions:

Identified by Department	\$ 4,131
From reading lists	\$ 1,519

Total	\$ 5,650 per year

Changes to Library profile:

196425 Environmental Impact Statements Law 44	\$ 260
390502 Environmental Studies 02	\$ 4,485
390505 Environmental Policy 02	\$ 2,759
390510 Water Pollution and Society 02	\$ NP
390520 Air Pollution and Society 02	\$ 44
390560 Human Ecology 02	\$ 1,376
390570 Energy Policy 036	\$ 400
3907 Technology and society 02	\$ 2,159
392002 Population Studies 36	\$ 650
51764525 Climatic variation and Change 28	\$ 235
51764540 Climate and Society	new
517650 Air Pollution Meteorology 28	\$ 700
691640 Environmental Health 02	\$ 2,020
782602 Water Conservation	\$ 375
7839 Forest Conservation	\$ 415

Total	\$15,878

Those headings with an even number after them represent a change from forms to books. Those without a number represent a new or added heading for the books profile.

The figure \$15,878 represents the purchase of all North American publications sold by our major vendor in these categories in 1993-1994. It does not include British publications. Consistent with past practice we expect to apply a number of non-subject parameter limits to these profile changes which will reduce this total. Our estimate of the final cost for the British and North American publications is \$10,500 per year.

Summary Recurring Costs:

Serials
Profile Changes

\$ 5,650
\$10,500

\$16,150 per year

THE TOTAL ONE TIME COSTS FOR THE DEPARTMENT ARE \$21,375. THE TOTAL RECURRING COSTS FOR THE DEPARTMENT ARE \$16,150 PER YEAR TRANSFER FROM BASE BUDGET.

The Library will pick up costs for added copies of \$5,320 from its fines account.

Please contact me if you have questions or concerns about this assessment (5946).

Regards,



RS

c.c. Sharon Thomas, Head Collections Management

doc is Course/Enviropl

175'

MEMORANDUM

W.A.C. Bennett Library, Simon Fraser University
Burnaby, British Columbia, Canada V5A 1S6

Date: 10 November, 1994

From: Ralph Stanton (Collections Librarian)

To: ✓ Dr. Chad Day, School of Resource and Environmental
Management

Re: Bachelor of Science Programme in Environmental
Planning and Management, Library Assessment

This assessment should be seen as a supplement to the document produced by our office on 10 November 1994 Re: *Bachelor of Science Programme in Environmental Planning and Management, Library Assessment*. We understand there has been a decision to proceed with the teaching of ENPL 100 and 200 and that the balance of the programme will be delayed for some time. This assessment can be regarded as a "down payment" on the costs outlined in the 10 November document.

ENPL 100-3 Global Change

There are 14 items on the reading list of which 4 are not in the collection and should be purchased at a cost of \$380.

ENPL 200-3 Environmental Dynamics

The one text for this course is in the Library but a added copy should be purchased at a cost to the Library of \$95.

Serials

The follow serials as not present in the collection and should be added at this time:

Ecological Economics	\$ 685
Journal of Risk and Uncertainty	\$ 415

Total Journal Costs	\$1100

Change to Library profile from forms to books:

3907 Technology & society 02 (1/2 full cost)\$1,080

COST SUMMARY

ONE TIME COSTS:

4 Monographs from reading lists	\$380	one time cost.
1 Added copy monographs	[\$ 95]	LIBRARY COST

Total	\$380	

RECURRING COSTS:

Serials additions, three added journals	\$1,100
Change to Library Profile	\$1,080

Total	\$2,180

THE TOTAL ONE TIME COSTS FOR THE DEPARTMENT ARE \$380. THE TOTAL RECURRING COSTS FOR THE DEPARTMENT ARE \$2,180 PER YEAR TRANSFER FROM BASE BUDGET.

Please contact me if you have questions or concerns about this assessment (5946).

Regards,

RS

RS

c.c. Sharon Thomas, Head Collections Management
Parveen Bawa, Associate Dean of Applied Sciences

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