IDRC – SABBATICAL

Final Report July 1, 1999 – July 30, 2000

The HIMALAYAN-ANDEAN PROJECT

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For

International Development Research Centre (IDRC)
Ottawa, Ontario

July 4th, 2000
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1. Goals and Objectives for Sabbatical

Goal of the Sabbatical Project: The general goal of my sabbatical was to assist researchers collaborating with IDRC projects in the Andes and Himalayan mountain regions to improve their understanding of interdisciplinary watershed based studies, to foster more interdisciplinary interactions, to introduce them to distance education using internet and hypermedia tools, to train them in conducting interdisciplinary research, and to assist them in the production of a multi-media CD-ROM of their projects. The ultimate goal was to initiate and facilitate greater interaction between projects and regions and to enable the IDRC-sponsored researchers to use computer and internet tools to share information and experiences.

The Specific aims are to:

a. Work with researchers in the Himalayas and the Andes to improve the interactions between the biophysical and socio-economic components, to work in a more participatory manner and to improve the use of analytical and communication tools in watershed studies.

b. Organize short workshops to teach researchers new approaches in the following areas: a) integrated watershed management, b) distance education using hypermedia CD-ROM and Internet techniques, c) linking bio-physical and socio-economic factors with GIS, and d) creating multi-media CD-ROM's of their projects.

c. Help research teams to build their own Web-Site for each project.

d. Review IDRC projects and programs.

e. Examine future research needs in water resource management in mountains.

f. Participate in workshops to address new methods and research needs to address development issues in mountains.

2. Accomplishments

The accomplishments are divided into the following categories:

2.1 Teaching and training
2.2 Communicating research results
2.3 Project reviews and advice
2.4 What was not accomplished

2.1. Teaching and training
Nine workshops were carried out during my sabbatical with a focus on a) Watershed Management, b) the use of multi-media computer techniques in communicating research results, c) the evaluation of Natural Resources Management in an integrated and interdisciplinary manner, and d) Distance Education via the Internet. A summary of the training workshops is provided in Table 1.

In addition to these formal courses individual training was provided for the IDRC-PARDYP researchers in Nepal. The purpose of this training was to create more awareness of the issues and problems associated with water resources management, to introduce the participants to approaches for distance education via the Internet, and to
demonstrate how GIS and hypermedia can be used as an integration tool for natural resources management.

Table 1. Training Workshops carried out between July 1999 and July 2000.

<table>
<thead>
<tr>
<th>Workshop Location</th>
<th>Time</th>
<th>Participating Organizations</th>
<th>Part. #</th>
<th>Topics Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lima, Peru</td>
<td>20-24/10/99</td>
<td>IDRC-CONDESAN MANRECUR, CAJAMARCA, PISA, CIP, MI-Bolivia</td>
<td>20</td>
<td>Computer programming for multi-media CD-ROM production (Toolbook) Distance Education Techn.</td>
</tr>
<tr>
<td>Vancouver, B.C.</td>
<td>10/02/00</td>
<td>Dept. of Fisheries and Oceans (DFO)</td>
<td>27</td>
<td>Integrated Watershed Management</td>
</tr>
<tr>
<td>San Salvador, El Salvador</td>
<td>24-29/2/00</td>
<td>World Vision (NGO's)</td>
<td>30</td>
<td>One week course in Integrated Watershed Management Distance Education Techn.</td>
</tr>
<tr>
<td>San Jose Costa Rica</td>
<td>5-10/03/00</td>
<td>IDRC-Minga, Ciat-Hillside, CIEDES, Univ. of Costa Rica</td>
<td>28</td>
<td>Integrated Watershed Management NRM-Integration methods using GIS</td>
</tr>
<tr>
<td>Bajo, Bhutan</td>
<td>1-3/04/00</td>
<td>IDR-C-Wetland Prod. Sys.</td>
<td>11</td>
<td>NRM-Integration methods Watershed management</td>
</tr>
<tr>
<td>Quito, Ecuador</td>
<td>1-7/04/00</td>
<td>IDRC-CONDESAN MANRECUR, CAJAMARCA, PISA, CIP, MI-Bolivia</td>
<td>15</td>
<td>Advanced course in multi-media CD-ROM production Distance Education Techn.</td>
</tr>
<tr>
<td>Bagio, Philippines</td>
<td>8-9/06/00</td>
<td>IDR-C-Ancestral Dom. Univ. of Philippines Govern. Representatives</td>
<td>70</td>
<td>Integrated and Urban Watershed Management Distance Education</td>
</tr>
<tr>
<td>Hue, Vietnam</td>
<td>16-17/06/00</td>
<td>IDR-C-BNRM Hang Ho Univ. Agr. &amp; Forestry Government Rep.</td>
<td>25</td>
<td>CBNRM Techniques Watershed Management NRM-Integration Distance Education</td>
</tr>
</tbody>
</table>

The Himalayan-Andean Project: Specific training was provided to 8 research teams (4 in the Andes and 4 in the Himalayas) with the intent of producing 8 multi-media CD-ROM’s of each of their watershed projects in a format that is comparable. The teams selected for this project are in Ecuador, Peru (2x), Bolivia, Nepal (2x), Bhutan, and China. All are, or were, part of IDRC funded projects. A summary of the participating teams is provided in Table 2 and a summary of the watershed setting is provided in the Himalayan-Andean WEB-Site (www.ire.ubc.ca/himal/himal_frame.htm). The multi-media “Toolbook” program was purchased for 4 research teams and the other teams purchased their own copy through CIP (Centro International de la Papa, Lima). The UBC team provided training for all the teams using hands-on sessions, and the Internet Bulletin Board approach is also being used as a way to help each team on a continuing basis. In order to make these projects comparable the framework shown in Figure 1 was used, which represents an approach for integrating resource use in watersheds and facilitates assessment of resource interactions. This approach has been used successfully in the PARDYP-Nepal project in 1997, and all teams agreed to follow this framework as closely as possible.
Table 2. Participants in the Himalayan-Andean project

<table>
<thead>
<tr>
<th>Country</th>
<th>Watershed</th>
<th>Participating Individuals and Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecuador</td>
<td>El Angel &amp; San Gabriel</td>
<td>Dr. C. Chrisman, Dr. Walter Bowen (CIP), P. Mena (Consortio Paramo), Dr S. Pouts (Manrecur II),</td>
</tr>
<tr>
<td>Peru</td>
<td>Cajamarca-La Encanada</td>
<td>Dr. Roberto Quiroz (CIP), G. Baigoria, C. Romero, M. Cruz, P. Sanchez (CIP, CONDESAN)</td>
</tr>
<tr>
<td>Peru</td>
<td>Rio Ilave-Huenque</td>
<td>R. Valdivia, R. Quiroz, M. Cruz (CIP, CONDESAN)</td>
</tr>
<tr>
<td>Bolivia</td>
<td>Desaguadero</td>
<td>J.C. Sanabria (Inst. Militar)</td>
</tr>
<tr>
<td>China</td>
<td>Xezhuang</td>
<td>Y. Xu, Y. Yongping (Kunming Inst. Ethno-Botany)</td>
</tr>
<tr>
<td>Bhutan</td>
<td>Lingmutey Chhu</td>
<td>Sangay Duba, Ganesh Chettry, Kezang Jamtsho (RNRRC)</td>
</tr>
<tr>
<td>Nepal</td>
<td>Jhikhu Khola</td>
<td>P.B. Shah, G. Nakarmi, B. Shrestha (ICIMOD) J. Merz (SDC)</td>
</tr>
<tr>
<td>Nepal</td>
<td>Yarsha Khola</td>
<td>P.B. Shah, G. Nakarmi, B. Shrestha (ICIMOD) J. Merz (SDC)</td>
</tr>
</tbody>
</table>

Figure 1. Framework used to design each watershed CD-ROM
After completion of the basic training course in CD-ROM design, and learning how to use the coding programming, each team started with the production of their multi-media CD-ROM. Whenever a team has difficulties in coding or frame design they can post their problem on the UBC-serviced Internet Bulletin board and the UBC team tries to respond by posting frames and modules that can be copied and modified by each participating team. As the project evolves, teams post some of their results and everybody can select modules and copy them into their program. This gives everybody the opportunity to get new ideas, to share information, solve problems, and learn from each other. So far this approach has worked surprisingly well. The only two problems we have experienced is that in the initial stages people were reluctant to post information (75% if the content originates from the UBC team), and we had to overcome the language problem (Spanish in the Andes, English for the rest). We expect that the sharing and posting of information will improve rapidly as the teams become more familiar with the software and the Internet tools.

Since the completion of the basic training in Lima, Oct. 1999, the Andean team has made significant progress. This was followed up with a more advanced training course in Quito in May 2000. We are currently discussing if it would be useful to bring the four Andean teams together in Sept/Oct. in Bolivia for a final hands-on session before completion of the 4 CD-ROM. So far each team has about 50% of the content for the CD-ROM in digital format and we anticipate a completion date by October 2000.

The Himalayan teams have operated on a more individual basis. The two Nepal and the Chinese teams are part of the IDRC-PARDYP project and coordination has been very easy because we had a head start in using the “Toolbook” software. The Bhutan group was phased in with some delay because they only recently had access to the Internet, and their computer skills are still somewhat limited. So the UBC team is taking the lead in the CD-ROM development of the Lingmutey Chhu watershed in Bhutan, and arrangements have been made to have the “Toolbook” training session in Bhutan at the end of October 2000. One of the Nepal CD-ROM’s (Jhikhu Khola Watershed) is completed and is used as a prototype. The second Nepal CD-ROM (Yarsha Khola Watershed) will be completed by September 2000, and a prototype of the Chinese CD-ROM (Xizhuang watershed) is ready. We anticipate that the final version of the Chinese and Nepal watersheds will be completed for the CBNRM Workshop in China in October 2000.

The most important thing about multi-media CD-ROM’s is that they serve as a platform for dissemination of results for each project on a continuing basis. This is not only more cost effective but the CD’s can be updated at any time, as more researches results become available. The goal is to have a first edition of all CD-ROM’s by October, and after that we can start a comparison within the region and between the regions. We are currently discussing the next steps of how to do the comparison with the IDRC-CBNRM and MiNGA project officers.

2.2. Communicating Research Results

2.2.1. Multi-media tools: Over the past few years the scientists have done a generally poor job in communicating the scientific results of their projects. I am convinced that the multi-media technology and the Internet can be used in a more effective manner for disseminating information and for educational purposes. Over the past four years the UBC team has produced 10 multi-media CD-ROM’s (2 for IDRC Projects, 6 for other
research projects, and two serve as electronic text books for graduate courses in watershed management which we teach over the internet). A list of the CD-ROMs and a summary of the Internet courses is provided in Appendix 1.

Another form of communication was to distribute the two IDRC CD-ROM's [Complex problems-complex options; preservation, degradation and rehabilitation in a Nepalese Watershed (by Schreier et al. 1997), and Gender and Resources Management in the Middle Mountains of Nepal (Brown, 1999)] and the Integrated Watershed Management CD-ROM (Schreier et al. 1997) to a wide audience. Interested researchers who attended the presentation, all workshop participants, and the collaborating research teams received copies of all three CD-ROM's. In total more than 100 copies of each were distributed.

2.2.2. Presentations and publications: A good part of my sabbatical was used to give lectures and conference presentations on how to use multi-media tools for disseminating research information on natural resources management, water resources management, and community based approaches to natural resources management. In the process I have given 17 presentations at conferences and 13 lectures to a wide range of audiences in 15 different countries (for details see section 3: Publications and presentations).

In addition, research results were published in 7 different book chapters, 4 refereed journal papers and in forms of reports and CD-ROM's. Two papers involving IDRC projects were completed and sent for reviews to international journals (for details see section 3 below).

2.2.3. Establishment of an Internet Network: The most important accomplishment of the sabbatical is the formation of an informal network of researchers who are collaborating and sharing information over the Internet. This network is not only built on the 8 Himalayan-Andean project team but now has representatives from the CIAT Hillside watershed project in Nicaragua, and the Hang Ho community project in Hue, Vietnam. This is proving to be a very effective way of teaching, sharing experiences and exchanging ideas.

To improve communication between the project teams, we are currently assisting seven teams in seven different countries to develop their own WEB-Site. Once completed they will all be linked and hopefully this will foster better cooperation, improve communication, and develop an environment where we can learn together. Table 3 provides a list of the projects for which WEB-Sites are currently being developed. The UBC based Himalayan-Andean-Project WEB-site with its Internet Bulletin Board serves as the teaching and communication tool and the other WEB-Sites will be linked once they are all up and running. All participants are very excited about this new way of communicating and we anticipate that this should foster collaboration and exchanges that were previously not possible.

The four Andean teams have come together twice as a result of the Andean-Himalayan project, fostering good communication and collaboration. The Ecuador CD-ROM project is in fact a collaborative venture between the Paramo-Group (NGO's) the IDRC-MANRECUR II group working in El Angel watershed and the CIP group working in the adjacent San Gabriel Watershed. They are jointly developing the CD-ROM. Similarly, several groups in the Cajamarca project in Peru are now collaborating. The CIAT-
several groups in the Cajamarca project in Peru are now collaborating. The CIAT-Hillside watershed in Nicaragua is collaborating on the Bulletin Board and their intent is to produce a similar type of a CD-ROM for their watershed in the near future.

Table 3. WEB-Sites under development

<table>
<thead>
<tr>
<th>Project</th>
<th>WEB-Site</th>
<th>Collaborating Individual</th>
</tr>
</thead>
<tbody>
<tr>
<td>CANADA</td>
<td>Himalayan Andean Project</td>
<td>H. Schreier, S. Brown</td>
</tr>
<tr>
<td>Ecuador</td>
<td>Combined Carchi Project</td>
<td>P. Mena, M. Proano, S. Poats, C. Chrisman</td>
</tr>
<tr>
<td>Peru</td>
<td>Cajamarca-La Encanada</td>
<td>R. Quiroz, M. Oliveras</td>
</tr>
<tr>
<td>Bolivia</td>
<td>Desaguadero Watershed</td>
<td>J.C. Sanabria</td>
</tr>
<tr>
<td>Peru</td>
<td>Rio Ilave-Huenque</td>
<td>R. Valdivia, P. Zorogastua</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Hang Ho Community project</td>
<td>A. Anh</td>
</tr>
<tr>
<td>Nepal</td>
<td>PARDYP project</td>
<td>B. Shrestha,</td>
</tr>
<tr>
<td>Bhutan</td>
<td>Lingmutey Chhu watershed</td>
<td>S. Duba, G. Chettri</td>
</tr>
</tbody>
</table>

2.3 Project reviews and advice

During my sabbatical I had the opportunity to review the IDRC-CBNRM program and the CIP-Natural Resources Management Program (in Lima Peru). I also participated in the CGIAR meeting in Holland in Sept. 1999 where discussions focused on how to bring natural resources management on a more equal footing with commodity based research and bio-technology within the CG system. Other participation included the CAPRI-CIAT workshop on watershed management institutions in Managua, Nicaragua, and the Joint CG-PRGA/NRI International Workshop on Participatory Research in Natural Resource Management at the National Resources Institute, University of Greenwich, Chatham, UK. I hope my contribution to these events on behalf of IDRC were useful.

Individual advice to IDRC research teams was provided during my project visits which included: Manrecur II, in Quito Ecuador; Cajamarca-CONDESAN in Lima Peru; Wetland Production System in Bhutan; PARDYP-China project in Yunnan; The PARDYP-Nepal project in the Middle Mountains of Nepal, the Ancestral Domain project in Bagio, Philippines; the Hang Ho Community project in Hue, Vietnam; Kato Community Forestry project in Dalat, Vietnam, the Community Forestry Project in Phnom Penh, Cambodia, and the Rattanakiri Community project in Cambodia.

2.4. What was not accomplished:

In addition to the tasks accomplished, I had the intention of translating the multi-media CD-ROM textbook “Integrated Watershed Management” into Spanish by adding voice buttons to the CD-ROM. Many of the South American partners requested such a version. Unfortunately, time did not permit me to write the scrip for the translation. The plan is to accomplish this task in August-September.

I also planned to deliver a strategy paper on research needs in the Water Resource Management area for IDRC. The Internet and multi-media training sessions took up more time than expected and as a result this paper did not materialize. If there is enough interest within IDRC for such a paper I will reconsider producing such a paper.
4. List of publications and presentations during sabbatical year.

4.1. Conference Presentations & Proceedings:


Schreier, H., S. Brown and P. Zandbergen.1999 The role of research in assessment of urban drinking water supplies, and New directions in using hyper media tools to communicate science to decision makers. International Seminar, Brazil/Canada Collaborative Project: Towards a new model for participatory sustainable development of urban watersheds. CIDA, and Municipality of Santo Andre-Sao Paulo, Brazil, Oct. 3-6, 1999. (200 participants)


Schreier, H. 2000. New approaches to water resources management. Semi-annual Meeting of
the British Columbia Environmental Network, February 10, 2000. Planetarium, Vancouver (evening session 20 participants)

Schreier, H. 2000. Linking Internet and Hypermedia tools for disseminating watershed management information. National Toolkit Planning workshop to design strategy for more effective use of computer tools to evaluate and disseminate fisheries resources information. Department of Fisheries and Oceans, Headquarter Ottawa, February 15-16, 30 participants (invited presentation)


Schreier, H. 2000. Community based natural resource management (CBNRM) in International Development; will it make a difference?. Annual IRE Workshop on Communities and Resource Management. February 14, 2000 at UBC, Vancouver (65 participants)


4.2 Lectures and Presentations:

Schreier, H. 1999. The use of hypermedia tools to develop decision support systems for natural resource management. At International Development Research Centre (IDRC) Ottawa, September 21, 1999


Schreier, H. 1999 Demonstration of Jhikhu Khola Watershed CD-ROM to the CIP and Manrecur II researchers in Quito, Ecuador, September 28, 1999

Schreier, H. 1999 Clear cool water: How to protect your groundwater resources. Public meeting evening session, organized by the Salmon River Enhancement Society, the Bertran Creek and Yorkson Creek, Walnut Grove, B.C. October 28, 1999, (60 Participants),


Schreier, H. 1999. Watershed research linking land uses with water pollution. Presentation of watershed case studies to CIEDES, University of Costa Rica, San Juan, (25 participants).


Schreier, H. 2000. Distance education in watershed management: A new approach to educate professionals. University of the Philippines, Bagio, Cordilleran Study Centre, July 8, 2000 (75 participants)

Schreier, H. 2000. Watershed management tools for community based natural resources management. Presentation to staff and students at Royal Department of Environment, Phnom Penh, Cambodia, June 23, 2000 (15 participants)


4.3 Workshop Training courses:


Schreier, H. 2000. One-day short course on Integrated Watershed Management for DFO officers involved in the Community based Fish enhancement program. At Simon Fraser University Downtown Campus, February 10, 2000 (27 participants)


Schreier, H. 2000. Three day training session in designing an integrated watershed project. Renewable Natural Resources Research Centre, Bajo, Wangdue, Kingdom of Bhutan, (11
participants). March 31-April 3, 2000


Schreier, H. 2000. Methods and approaches in watershed management. Two day training session. University of the Philippines, Bagio, Cordilleran Study Centre, June 8-9, 2000 (70 participants).

Schreier, H. 2000. Hypermedia and GIS techniques in community based watershed management. Two day training workshop. University of Agriculture and Forestry, Hue, Vietnam, June 16-17. (25 participants)

4.4 International Research Program Reviews:


4.5 Research Reports:


4.6 Multi-MEDIA CD-ROM Production:


Wong, C., H. Schreier, and Tom Northcote. 1999. Land use impacts on shore spawning Kokanee; an evaluation of Okanagan lake. For: B.C. Ministry of Environment, Fisheries Branch, Multi-media CD-ROM@IRE


4.7 Papers in Refereed Journals


4.8 Papers submitted for Review:


4.9 Chapters in Books:


4.10 Papers Reviewed for Journals

Geomorphology  April 2000
Environmental Management, May 2000

4.11 Committees:

University Committee for the Creative Use of Learning Technologies Faculties of Agriculture and Forestry. May 9, 2000 Presentation on the New Internet Course on Urban Watershed Management, UBC.
NEWS Interviews:

4.12. News Interviews
Interview on CBC Newsworld on the safety of community water supplies. Ann Petry, May 25, 2000

5. Activities between July 1999 – July 30, 2000

April-June 1999: Review of IDRC’s CBNRM program
(with J. Chevalier, Carleton University)

July 4, - July 16, 1999: At IDRC, Ottawa
• Finalized sabbatical program
• Learned about IDRC
• Made contacts and initiated research program
• Gave presentation on teaching methods over the Internet

July 18 – August 4, 1999: At UBC, Vancouver
• Prepared for upcoming workshop in China
• Contacted potential collaborators for Himalayan-Andean CD-ROM project
• Reviewed Bhutan- IDRC proposal

• Gave Short Course in GIS application to IDRC Gitxsan project

August 7-21, 1999. Institute of Ethno-Botany, Chinese Academy of Sciences, in Kunming, China
• Conducted training workshop for the Chinese PARDYP team on the use of Hyper-media techniques in integrated natural resources management; water quality assessment and monitoring techniques; Soil nutrient analysis and modelling (20 participants from 4 different Institutions in Yunnan). Four day field trip to watershed in Western Yunnan

August 22-29, 1999. International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal
• Finalized PARDYP Proposal–Phase
• Completed revisions of papers for publication of PARDYP Workshop Proceedings (24 papers)
- Presented a paper at the International Symposium on Remote Sensing and GIS for monitoring soil and geomorphic processes to assist integrated development of mountain land, in Kathmandu.

**August 31-Sept. 3, 1999. At National Resources Institute, University of Greenwich, Chatham, UK.**
- Participated in International Workshop on Participatory Research in Natural Resource Management (PRNRM)
- Presented keynote address
  This workshop was organized by CIAT and NRI and focused on sharing experiences in participatory research in natural resource management.

**September 3-5, 1999: At Oosterbeek, Netherlands**
- Participated in the CGIAR Workshop on Integrated Natural Resource Management to strengthen Integrated Natural Resources Management (INRM) research within the CGIAR system. The aims of this three day workshop were to develop a strategy to assure that integrated natural resource management research gets on a more equal footing with commodity research and bio-technology Emerging challenges, criteria for defining future research priorities and expected scientific breakthroughs were identified by the 50 invited participants.

**September 6, 1999: At Dutch Development Office, Amsterdam**
- Visited the Dutch development office to discuss possible co-funding of Bhutan Wetland systems project (with Ronnie Vernooy)

**September 8-10: At Group for Development, Univ. of Bern, Switzerland**
- Discussed the program for the Mountain Agenda, activities planned for the Year of the Mountains (2002), collaborations, and PARDYP activities

**September 15-22, 1999: At IDRC, Ottawa**
- Discussion on participatory research methods, collaborative research on health impacts from excessive use of pesticides,
- Presentation (lunch seminar) Building user friendly decision support systems with hypermedia tools for Natural Resource Management applications.
- Prepared program for next 4 months

**September 22-27, 1999: At UBC, Vancouver**
- Finalized papers for nutrient conference at University of Waterloo in June 2000
- Prepared for presentations at urban watershed conference at SEMASA, Sao-Paulo, Brazil.
- Prepared for visit to IDRC project in Ecuador and NRM review at CIP in Lima, Peru.

**September 28-30, 1999: At CIP, and Manrecur, Ecuador**
- Visited the MANRECUR (CONDESAN) project with S. Carter and C. Crissman (CIP) to discuss collaboration on CD-ROM project
- Attended MANRECUR workshop and field trip to study area

**October 1-5, 1999: At Sao Paulo Brazil**
- Gave presentation at conference on drinking water protection for Sao Paulo’s waters supply. Collaborative project between UBC and Santo-Andre Municipality (CiDA project)

**October 6-13, 1999: At CIP, Lima Peru.**
- Team leader for review of Natural Resource Management Program of the International Potato Research Centre (CIP), Reviewed research program in Ecuador, Peru, Bolivia. ICER-Review.
October 14-15, 1999: At Vancouver, Canada

October 17-18, 1999: At World Vision, El Salvador
- Discussed program for five-day training course in integrated watershed management (Scheduled for February 24, 2000) for NGO’s in El Salvador, Nicaragua and Guatemala (with representatives from World Vision).

October 19, 1999: At CIEDES, San Jose, Costa Rica
- Discussed five-day training session in Integrated watershed management for Minga and CIAT researches in March 2000
- Gave presentation on approaches to Internet based teaching (20 participants)

October 20-25, 1999: At CIP, Lima. Peru
- Conducted a five-day training course on the use of hypermedia and GIS tools for natural resource management and watershed analysis for the CONDESAN group of the Andean countries (In collaboration with Dr. Sandra Brown and Dr. Paul Zandbergen) 20 participants (starting the process of creating CD-ROM’s for the Himalayan–Andes watershed initiative).

October 26- November 1, 1999: At UBC, Vancouver
- Preparation of Urban Watershed CD-text for Internet course starting in March2000.
- Designed Internet site for Himalayan-Andean project

November 2- December 5, 1999: At Landcare Research, New Zealand
  This one-month leave from the IDRC sabbatical will be made up at the end of June by extending my IDRC sabbatical to July 30, 2000. (Approved by J. Voss in June 1999)

December 6, 1999 – January 20, 2000: At UBC
- Designed Himalayan-Andean website for CD-ROM programming assistance
- Reviewed proposal for CBNRM
- Analyzed research results from the IDRC-Pardyp project and prepared two manuscripts which were submitted for reviews to refereed journals
- Discussions with S. Tyler and J. Graham on CBNRM involvement

January 21 – 29, 2000: At IDRC Ottawa
- Discuss participation for the two training workshops in Central America in late February
- Link up with other researchers to determine possible collaboration

January 30 – February 20, 2000: At UBC
- Preparation for workshop
- Writing papers for IUFRO and Waterloo Conference
- Work on Himalayan Andean Web-Site

- Conduct one week training course in Integrated Watershed Management

February 26-March 3, 2000: At UBC
- Working on Urban Watershed Management CD-ROM
- Preparing for Costa Rica Workshop
March 4 –12, 2000: CIEDES, University of Costa Rica
- Conducted 5 day training session on Integrated Watershed Management for MINGA, CIAT and University researchers

March 13-15, 2000: At Managua, Nicaragua
- Gave keynote presentation at CAPRI/CIAT Conference on Watershed Institutions

March 16-18, 2000: At UBC
- Preparing for Nepal workshop and conference presentation

March 19-March 30, 2000: At ICIMOD, Kathmandu, Nepal
- IDRC-PARDYP project coordination meeting
- Fieldwork in Jhikhu Khola
- Presentation of paper at International Conference

March 31-April 7, 2000: At RNRRC Centre, Bajo, Bhutan (with Liz Fabjier)
- IDRC-Sustainable Production systems project review
- Short training course in water resources monitoring
- Fieldwork setting up long term forestry and agricultural monitoring plots
- Collected information for Web-Site development and multi-media CD-ROM

April 9-April 15, 2000: At UBC
- Working on Urban Watershed CD-ROM
- Preparing paper on Scaling

April 16-19, 2000: At CBNRM meeting in Victoria, B.C. (with CBNRM team)
- Participated in the annual CBNRM meeting

April 20-30, 2000, At UBC
- Prepared for upcoming training session in Ecuador
- Worked on revisions of papers

May 1-7, 2000: At MANRECUR, Quito, Ecuador (with Simon Carter)
- Conducted a one-week follow-up training course in multi-media CD-Rom production for the four Andean research teams
- Reviewed individual projects and solved multi-media technical problems

May 8-13, 2000: At UBC
- Worked on final version of Urban watershed management CD-ROM
- Improved Internet Bulletin Board communication for Himalayan-Andean teams

May 14-20, 2000: At SEMASA, Sao Paulo, Brazil
- Gave presentation on watershed management at conference
- Completed training session on ESA evaluation for Brazilian team member associated with the CIDA’s watershed project to improve water supply in poor areas (favelas)

May 21-June 4: At UBC
- Worked on Himalayan-Andean Website
- Prepared CD-ROM for IDRC-PARDYP project

June 5- 10, 2000, At University of Philippines, Bagio (with John Graham)
- Reviewed IDRC-Ancestral Domain Project
- Gave lecture on distance education
• Conducted two-day training workshop in watershed management

**June 11-19, 2000: At Hue and Ho Chi Minh, Vietnam (with John Graham)**
• Participated in Multi-stakeholder meeting in IDRC’s Hang-Ho project in Hue
• Gave a two day workshop on watershed management, GIS and distance education
• Reviewed research progress and visited field site in Hang Ho community
• Visited IDRC’s Kado project in Dalat
• Reviewed research progress and discussed future work

**June 20-23, 2000: At Phnom Penh and Rattanakiri, Cambodia**
• Visited IDRC’s Community Forestry project including field trip
• Gave presentation on watershed management to Ministry of Environment people
• Discussed co-funding of IDRC’s Ratanakiri Project with SIDA
• Visited Ratanakiri project sites and gave presentation

**June 26-July 2: At UBC**
• Prepared presentation for IDRC Ottawa
• Prepared Final Report on Sabbatical Activities

**July 3-July 10: At IDRC, Ottawa**
• Two presentations on sabbatical activities and distance learning
• Meet with IDRC staff and delivered final report

**July 11-15, 2000: at University of Waterloo**
• Presentation of conference paper on IDRC’s Nepal project

**July 16-30, 2000: at UBC**
• Completion of Web-sites for participating teams in Bhutan, Vietnam, Bolivia and Ecuador.
• Continuing assistance to Himalayan-Andean teams for CD-ROM production via Internet bulletin board

**5. On-going activities**

A number of activities are ongoing and these can be divided into the following

5.1 Maintain the Himalayan-Andean WEB-Site and Bulletin Board
5.2 Continue with project WEB-Site development
5.3 Completion of CD-ROM for 2nd Nepal Watershed
5.4 Additional multi-media training sessions
5.5 Himalayan-Andean project comparison

5.1 Maintain the Himalayan-Andean WEB-Site and Bulletin Board
The UBC team will continue to assist each team in the development of the CD-ROM. The network will be maintained through the WEB-bulletin board that serves as a continuing education and information exchange tool. With this tool we hope we can continue to assist all 8 teams to solve their technical problems associated with the CD-ROM production. We will also improve the WEB-Site once we receive more input from the network and the collaborators.

5.2 Continue with project WEB-Site development
We are assisting all four Andean teams in the development of web-sites. The Peruvian and Ecuadorian web-sites will be hosted on the CIP Server. For the Himalayan part of the project we will continue the development of the PARDYP and Bhutan web-sites. Both will be hosted on the IDRC-PAN Asia server. Similarly we will assist the Hue-
Vietnam team in improving their web-site. The Hue team in Vietnam has produced a first edition of a web-site and the UBC team is helping them to upgrade the site and place it on the PAN Asia Network. We also just purchased the “Toolbook” software for them because they intend to develop a multi-media CD-ROM for their project. We will teach and assist them over the Internet on the technical issues of creating a CD-ROM

5.3 Completion of CD-ROM for 2nd Nepal Watershed
As part of the IDRC-PARDYP project we are currently developing a multi-media CD-ROM for the Yarsha Watershed. All field information has been transferred into the GIS and we anticipate having the CD-ROM ready for the CBNRM meeting in China in October 2000.

5.4 Additional multi-media training sessions
The Andean teams have suggested to possibly holding a final training session in Bolivia, before completion of the first CD-ROM in late September. We will evaluate this possibility and determine if the UBC team could or should spend one week in Bolivia to help the teams with the final production of the CD-ROM or if this could be done via the Internet.

A “Toolbook” training session is to be held in late October in Bhutan (cost to be covered by the Bhutan-IDRC project).

The possibility of adding one researcher from the Hue-Vietnam team to the Bhutan training workshop will also be explored.

5.5 Himalayan-Andean Project Comparison
We will continue the process of establishing a framework to compare the 8 watersheds. The plan is to submit a proposal to CBNRM for financial support for next year to complete the comparison and present the results in a multi-media CD-ROM format. We are awaiting the completion of the 8 CD-ROMs before we can produce the comparative CD. However, initial discussions are under way with the research teams to develop the framework for this work.

6. Future Suggestions for IDRC Collaboration
There are four suggestions for future IDRC-UBC collaboration and these include:
6.1. Expansion of network
6.2. Conference on Mountain Watershed Management in 2002
6.3 Distance education course development
6.4 Using of voice and video to facilitate communication between continents

6.1 Expansion of network
The internet/bulletin board tool offers IDRC a unique way of communicating and assisting IDRC project teams. This could foster improved sharing of information and comparison of results. The potential is enormous and would not require significant financial resources. One idea would be to expand the watershed network to the African Mountains and other projects in the Middle East where water resources management and land-water interaction processes are critical. The UBC team would be willing to share the experience of building such a communication and interaction network. The same approach could be used to develop other networks within IDRC programs (e.g. Biodiversity, coastal zone and fisheries, urban agriculture, etc.)
6.2 Conference on Mountain Watershed Management in 2002
The UN will declare 2002 as the Year of the Mountains and IDRC would be very well positioned to sponsor a major International Conference on mountain issues. This falls well into the IDRC mandate since it deals with marginal areas that have the highest biodiversity. These environments are fragile, have many indigenous and poor people, the gender issue is more acute in these environments, and the pressure on the mountains for hydropower development and water supplies for the lowlands is increasing rapidly. The Institute for Resources and Environment (IRE) at UBC would be willing to host such an event in May or June of 2002 at UBC or In Whistler, B.C. but would need financial support from IDRC. We are discussing this initiative with the Centre for Development and Environment at the University of Bern, Switzerland, and the Swiss Agency for Development and Cooperation (SDC). A detailed proposal from IRE will be forthcoming.

6.3 Distance education course development
IDRC is in a unique position to exploit distance education tools for many of their programs. Most of the IDRC sponsored research projects contain a wealth of data, and information that is not as widely shared between projects, NGO’s and other International donor agencies as they could be. There is great need for educational material for researchers in developing countries and it is becoming increasingly difficult and expensive to sponsor students to come to Canada for advanced education.

Internet based distance education offers a unique possibility to assist young and upcoming researchers and to get access to education material and interact with other researchers on a continuing basis. There is also an additional need for professionals in the Third World to retool and upgrade their knowledge and this can be done effectively via the Internet.

Our IRE team has successfully launched a graduate level certificate in watershed management. Three of the 5 required courses for the certificate are already on line and over the next two years the remaining two will be completed. What is missing is a good course on integrated watershed management in developing countries. A wide range of IDRC sponsored case study material available and this would make such a course unique. The justification for it is fivefold:
1. Water Resource Management Issues are and will continue to be critical for the development of the poor countries
2. Resource conflicts can best be assessed and integrated using a watershed approach
3. The IDRC case study material can readily be used for assisting communities to improve water supplies, pollution and irrigation
4. The Himalayan-Andean project will provide excellent digital material that can be used for regional comparisons and for learning how to deal with different land use conflicts that have an adverse effect on water resources
5. The lack of attention for protecting water resources is slowing development in many parts of the world and the best way to improve this is to focus on public and professional education and capacity building.

We would be interested in developing such a course and we will submit a detailed proposal to IDRC in due course.
6.4 Using of voice and video in CD-ROM’s to facilitate communication between continents

Language difficulties remain a problem in third world development and access to information in local languages continues to impair education and information transfer. It is now readily possible to add voice and video to multi-media CD-ROMs. This not only reduced the undesirable need to place pages and pages of text on CD-ROMs to be red on computer screens but it will make it possible to narrate the graphical material in any language. In fact it is possible to add several voice buttons to the CD-ROM so that the user can choose the language.

We have developed a multi-media electronic text-book on integrated watershed management that has been in use for a distance education course for the past three years. Our South American partners have suggested that it be translated into Spanish so that a wider audience in the Southern hemisphere can access the information. World Vision, CIAT, CIP, and many NGO groups would benefit from such such a translatable product where the user has the choice of either listening to the narration in English or Spanish. This can be done with relatively little cost. (approximately $7000.-). Once the script for the narration has been written it is then possible to translate it into any language. This could then lead to translations of all CD-ROM’s that are currently being produced as part of the Himalayan-Andean projects and could include narration in Chinese, Nepali, Vietnamese etc.

7. Evaluation of Sabbatical Experience

7.1 Overall experience.
For me the IDRC sabbatical fellowship has been a wonderful experience. It enlarged my knowledge about Third World development issues, it allowed me to develop an excellent network between IDRC-project teams and Universities in South America and Asia. I was able to give presentations in 15 different countries and visited 12 IDRC project sites, discussed research issues, methods and approaches with more than 100 researchers in the developing countries, and hopefully assisted a few teams in their efforts to access scientific information via the Internet.

Having had the opportunity to spend most of my time in field based projects rather than in Ottawa was particularly useful to me, because people in the IDRC headquarters in Ottawa are spending an enormous amount of time on administrative tasks. This leaves them little time to work with project researchers in the various countries to help them to address the resource problems and development issues they are involved in. I am also grateful that my sabbatical was unaffected by the travel ban that occurred in February and March 2000, because this allowed me to complete my planned training program in South America.

I also cherished the freedom that was granted to me by Joachim Voss and other IDRC staff to virtually set my own agenda and explore new ways of communication, information sharing, and developing new approaches to research.

Probably the greatest privilege was to be able to travel with several IDRC Project officers, to visit their projects, listen to the issues the local research teams were trying to
address, and learn from them how they are trying to solve resource management problems.

7.2 IDRC Projects
In general the IDRC sponsored projects which I visited (CBNRM and MINGA Program) are very pertinent and going in a fruitful direction. Both programs address resource conflicts and try to integrate socio-economic evaluations with more conventional science based investigations (commodity based, field trials, and forest plot research). All are very complex and highly challenging but in several cases success stories are readily apparent. I would like to mention four: The Hang Ho project with the University of Hue in Vietnam, The Wetland Production Systems Project with RNRRC in Bhutan, the Ratanakiri NRM project in collaboration with CARERE, in Cambodia, and the Eco-health project with CIP in Ecuador. These four projects clearly reflect what IDRC is all about. They assist young and dynamic researchers, they address the key resource issues, they involve poor communities in marginal environments, they integrate and link human (gender) and bio-physical resources, and they work closely with farmers and the local communities. In these projects the IDRC contribution is extremely well receive not only at the project level but by the community, and the regional and local government agencies. The project officers that nurture these projects along and the key researchers involved in these projects should be congratulated. They clearly push the limits of traditional research and they experiment in new and innovative ways to improve the management of the resources and the livelihood of poor people.

7.3. Collaboration with IDRC professional staff
This is one area where my expectations were not entirely met. I will qualify my remarks by stating that I only visited a small proportion of projects and in a limited subject area. Hence my comments might not be reflective of what is happening in other IDRC programs. My interactions were limited to 10-12 people and this is partially my fault because my interests do not match with many of the professional staff in Ottawa. It also proved difficult to coordinate travel schedules. However, I feel that most officers in Ottawa are so overloaded with administrative tasks that they have little time to contribute actively to the research issues the recipient researchers are trying to address. The second problem is the cut-back in travel. This in my view is very unfortunate because the effectiveness of each project is to a great extent dependent on continuing collaboration between IDRC officers and the research team. Email alone will not do it! The fact that only 2 of the CBNRM officers are based in the region is very unfortunate. Both are making a great effort to visit their projects on a regular basis and there is an excellent rapport between the IDRC people and the teams. I have the impression that such rapport is less well developed in those projects where visits are sporadic and infrequent.

Another problem which I found surprising is that almost all projects I visited and reviewed had a large agricultural and forestry component. However, there is very little expertise left at IDRC in the more scientific areas of crop production, soils, hydrology, forestry. It seems to me that there has been a very profound shift towards the social sciences and economics to the point where physical based scientists are becoming an endangered species at IDRC. I think this is unfortunate because if we want to be able to resolve the complex resource issues in the developing world we need to have a team that is more balanced.

What is refreshing is that all IDRC staff are committed to the cause of development and are putting in an admirable effort.
7.4 Recommendations

I have benefited enormously from my IDRC sabbatical and hope that my recommendations are constructive.

7.4.1 More use of Internet and multi-media tools
7.4.2 Initiatives in distance education
7.4.3 Project visits, subject matter balance and new areas of research emphasis
7.4.4 Maintain Young Canadian and Post Doctoral Fellowships
7.4.5 Co-funding and parallel funding
7.4.6 Maintain Sabbatical Fellowship program if possible

7.4.1. More use of Internet and multimedia tools
There is an urgent need to provide advice and assistance to IDRC-sponsored project teams on the use of WEB-based tools. This is particularly important because many developing countries have only recently come on-line and lack expertise and experience in developing Internet WEB-Sites and using the technology for communication and for information exchange. I am aware of the efforts by PAN-Asia and the IDRC assisted efforts to introduce the Internet to Bhutan and Africa. However there is a lack of such assistance in South American and there is a need for in-house expertise to be help and advise teams to build WEB-Sites and use the Internet tools effectively to link projects. This should not only be done within programs but also between programs since there appears to be a lack of course program collaboration.

7.4.2. Initiatives in distance education
One of IDRC’s main mandates is to build research capacity in the developing countries. Distance education programs can make a large and effective contribution to this mandate, particularly since IDRC has a wealth of case studies from which to draw. This however means that multi-media programs need to be developed featuring successful projects, research methods and approaches and they have to be delivered in an effective digital format. A closer collaboration between IDRC and Canadian University in this area is most desirable, since it will have mutual benefits to both organizations. IDRC for example could support the development of distance education programs with a joint venture between IDRC-Canadian and developing country universities. IDRC projects could be featured in case studies demonstrating commonalties, differences, successes and failures to solve key problems. Courses could include: Community forestry, agro-forestry bio-diversity, community based natural resource management, international watershed management, coastal zone management, local inland fisheries management, IPM and health, etc.

7.4.3. Project visits, subject matter balance and new areas of research emphasis
It is unfortunate that travel budgets are reduced for project officers during financial crunches. However, I feel that regular biannual field visits by project officers is essential because it helps to nurture project teams along. This is essential if IDRC hopes to maintain high quality research projects. This is done most effectively by maintaining project officers in the regions and not in Ottawa. Email communications alone will not do the job effectively.

Also, I feel there is a significant imbalance between social and bio-physical science expertise within IDRC. Most CBNRM and MINGA projects deal primarily with agricultural, forestry, hydrology, and livestock issues and there remains very little
expertise in the basic sciences within IDRC. This should be rectified in the near future if IDRC hopes to address the complex global resource issues effectively.

There are several areas where IDRC could strengthen their efforts. One of the areas which stands out and is close to my field of interest is Water Resources Management. This is the one issue that is common and critical in all 12 IDRC projects which I visited. Given the rapidly increasing problem with water pollution, water shortages, flooding and hydropower development there is a need to look at water resources not only from the engineering and treatment perspective but from the natural resource management point of view. At present IDRC’s water focus is limited to the arid areas of the Middle East. However, water problems are now a global issue that needs much greater attention. It is surprising to me that in most places on earth (including Canada) bottled water is now more expensive to purchase than petroleum. However, consumers only protest over petroleum prices and not over water prices. Water treatment costs are on an exponential rise and shortages and more frequent floods are also increasing rapidly. IDRC is well placed and could integrate such a component into their programs.

7.4.4 Maintain Young Canadian and Post Doctoral Fellowships
We at IRE/UBC were fortunate to be the past recipient of two Young Canadian and one Post Doctoral Fellowships. These are cost effective programs because the Canadian researchers can work closely with the recipient country’s researchers and both will benefit by teaching each other and learning form each other. This is a very good way of building capacity.

7.4.5 Co-funding and parallel funding
To me it is frustrating to see how much time and effort is spent in trying to come up with parallel funding. Having been intimately involved in negotiating co-funding for the PARDYP project with SDC and ICIMOD a few years ago gave me an insight into the difficulties associated with trying to please three donor organizations all with different philosophies. Although our experience turned out well in the long run, much too much time was spent on negotiations all at the expense of research. Co- or parallel funding should only be encouraged when partners come together on a voluntary basis because they see a common goal, have similar philosophies, can work together, and complement each other.

7.4.6 Maintain Sabbatical Fellowship program if possible
My sabbatical experience was excellent and I am most grateful for the opportunities I had under this program. It gave me the opportunity to gain a much better understanding of the complexities associated with development issues. I do hope you maintain this program so that others may benefit as much as I did.
Appendix: List of multimedia CD-ROM’s and on information on Distance Education Courses

Multi-media CD-ROMs produced by the Institute for Resources and Environment at the University of British Columbia, Vancouver. See also CD-ROM products: www.ire.ubc.ca/cdrom_w.html

Integrated Watershed Management 1997
Authors: H. Schreier, K. Hall, S. Brown, L. Lavkulich and P. Zandbergen
Description: This CD-ROM is the electronic textbook for a graduate level distance education course offered at the University of British Columbia, but can be purchased without taking the course. It covers all aspects of watershed management (including biophysical, socio-economic and institutional) as well as a number of case studies.
Keywords: watershed management, watershed assessment techniques, water quality, aquatic biota, sediment, hydrology, community involvement, partnerships, institutions for watershed management, forestry, mining, agriculture, urbanization, hydro-power.

Watershed management in the Nepalese Himalayas 1998
Complex problems - complex options: Preservation, degradation and rehabilitation in a Nepalese watershed
Authors: S. Brown, H. Schreier, W. Tamagi, P.B. Shah, G. Nakarmi, and B. Shrestha
Description: The Nepal multi-media CD-ROM is the result of an 7 year integrated watershed study that covers most of the important bio-physical and socio-economic aspects of resource degradation in the Jhikhu Khola watershed, in the Middle Mountains of Nepal. Soil erosion, sedimentation, deforestation, soil fertility decline, water supply for drinking water and irrigation, and water contamination are the key topics addressed. The land use and soil fertility analysis was conducted using GIS techniques and quantitative information is provided on degradation rates and land use dynamics. Recommendations are made on preventative measures, and case study material is provided on land rehabilitation and afforestation. The socio-economic information reflects information collected during PRA’s and RRA’s. The CD-ROM provides a blueprint for integrated, community based watershed assessments.
Keywords: Nepal, soil erosion, deforestation, soil fertility, GIS, land use dynamics, land rehabilitation

Assessing non-point sources of pollution in watersheds: Case studies in the Lower Fraser Valley, BC, Canada, 1998
Authors: H. Schreier, K. Hall, W. Tamagi, P. Zandbergen and S. Brown
Description: The NPS multi-media CD-ROM contains 5 case studies addressing non-point (NPS) sources of pollution in streams and groundwater. Three watersheds were examined in detail using GIS techniques to quantify current and historic land uses. Sediment and water quality was analyzed over a three-year period to determine the status, variability and processes of NPS pollution. The first case study focuses on urban non-point sources related to transportation and impervious surfaces. Metals, organic and microbial contaminants were used as indicators. The second case study covers a watershed at the urban rural fringe and addresses excess nutrients and microbial problems from septic systems, hobby farms and commercial farms, and includes nitrogen budget analysis and simulation modeling. The third case study covers an agricultural watershed, which has very high livestock intensity. The fourth case study examines an unconfined aquifer and determines the source and extent of the nitrate problems from septic systems, hobby farms and agriculture using GIS overlays and scenarios simulation modeling. The fifth case study represents a groundwater strategy for a municipality and this can be used as a blueprint on how to examine the vulnerability of groundwater resources for NPS contamination at the municipal level.
Keywords: urbanization, agriculture, urban/rural fringe, stormwater runoff, environmentally sensitive areas, groundwater, agricultural waste management, best management practices

Resource Dynamics in the Goldstream Watershed - Revelstoke, BC -Canada 1998
Authors: W. Thompson, S. Brown, I. Vertinsky and H. Schreier
Description: This CD-ROM contains the results of a GIS-based modeling project that examines land use conflicts between forestry, wildlife, and recreation in the Columbia Mountains of British Columbia. A number of land use scenarios were simulated and the conflicts and trade-offs were compared using "multiple accounts" methods. The forest growth was modeled over a 120-year cycle using 4 different management scenarios. The mountain caribou was used as a wildlife indicator and habitat suitability was determined for
four different seasons. Telemetric data was used to verify the model. Helicopter skiing was examined for the recreational component of land use and conflicts. The trade-offs were compared in multi-dimensional frameworks using net present values for timber harvesting and heliskiing and amount of high quality habitat for caribou. All information in the CD-ROM can be accessed in an interactive manner and the displays are in GIS and graphic formats.

Keywords: caribou, wildlife habitat, heliskiing, forestry forest management, resource conflict, trade-off analysis, multiple accounts, GIS, scenario modeling, habitat suitability

Land-use – fish interactions along the shoreline of Okanagan Lake 1999
Authors: Wong, C. H. Schreier, S. Brown
The Okanagan multi-media CD-ROM addresses the possible impacts of land use on shore spawning kokanee fish in Okanagan lake. It contains a historic analysis of the change in fish spawning numbers over the past 20 years in different parts of the lake. At the same time historic land use change analysis was conducted within a 500-m buffer zone along the lakeshore using historic aerial photos (1963-1996) and GIS techniques. This included changes in shoreline development (houses and docks), historic lake level fluctuation, and a current assessment of spawning habitat. The interaction between land use changes, fish habitat, and fish numbers were examined to document possible cause and effect relationships. The multi-media CD-ROM contains a video clip on the kokanee issues and provides interactive GIS displays of the fish/land use problems around the lake.

Urban Watershed Management 2000
Authors: P. Zandbergen, H. Schreier, K. Hall, S. Brown, R. Bestbier
This CD-ROM is the electronic textbook for a graduate level distance education course on urban watersheds offered at the University of British Columbia, but can be purchased without taking the course. It provides a very comprehensive and useful resource for anybody involved in managing water resources in urban areas, including municipal officials, community groups, consultants, agency representatives, watershed educators and interested individuals. In addition to many full-color images, diagrams and maps, the CD-ROM also contains a number of sound and video clips.

Keywords: impacts of urbanization, watershed monitoring, hydrology, stream channels and sediments, water and sediment quality, aquatic habitat and biota, watershed mapping and GIS, watershed modeling, watershed management plans, political, institutional and legal issues, land use planning and conservation, economic and financial considerations, stewardship and education, site design, land development, stormwater "Best Management Practices", erosion and sediment control, watershed restoration, impervious areas, riparian buffer zones, flooding and floodplain management and involvement, and Environmentally Sensitive Areas.

Himalayan Sediments: Issues and Guidelines 2000
Authors: V. Galay, H. Schreier, R. Bestbier, S. Brown and W. Chan
The natural processes of erosion, transport and deposition of sediment have proven to be far more complex in the Himalayan Mountain region than others throughout the world. The objectives of this CD-ROM are to provide basic information on sediment producing process relative to infrastructure development in the Himalayas; provide resource managers with approaches to determine sediment yields for specific geologic zones; to present information on sediment related problems at various infrastructure sites; and provide guidelines on how to address sediment issues and processes at new sites. Topics covered include: geologic setting, rainfall and runoff, sediment measurement and analysis, sediment sources, sediment transport, sediment deposition, river degradation, and guidelines for infrastructure.

Keywords: Himalayan, sediments, erosion, hydrology, infrastructure
Available: April 2000

Gender & Resources in the Middle Mountains of Nepal 1999
Authors: S. Brown
This CD-ROM is the product of a research project at the University of British Columbia funded by the International Development Research Centre (IDRC), Ottawa. The aim of this research is to document the situation of rural women and gender relationships in the Jiri region of the Middle Mountains of Nepal. Community forestry initiatives have restricted access of women to forest products creating serious problems for poor households that have no alternative sources. Road access has had a major impact on fertilizer use, off-farm income and the development of market opportunities. Educating rural women is critical as women are asked to join user groups and sign agreements. Community based programs have been initiated based on issues raised by women include: fuelwood efficient stoves, fodder grass and tree seed distribution, community water supply, adult female literacy classes and income generation schemes.
Integrated Watershed Management – A graduate level course
Delivered via CD-ROM, Internet bulletin board and email

This distance learning course provides an overview of watershed management for practicing professionals wanting an up-to-date understanding of integrated water resource management. The course is CD-ROM based and uses an Internet bulletin board and email for discussion.

Who will benefit?
Practicing professionals, graduate students, and others whose work involves resource management and who need the convenience of distance study while increasing their knowledge.

What are the prerequisites?
Participants should have a bachelor's degree in a related area such as earth sciences, environmental engineering, resource management or environmental sciences, or the equivalent practical experience. Those with backgrounds in planning, economics and policy analysis who are comfortable with scientific information and descriptions of quantitative analysis techniques will also find the course of interest. Participants need access to a suitable computer and the Internet.

What is unique about the course?
• Adopts an interdisciplinary approach to the topic areas, with the guiding principle that water quality and quantity are indicators of environmental health.

• Uses a distributed learning format with the richness of hypermedia computer tools, models and images, enhanced by Internet discussions, questions and responses, and problem solving.

• Is a core requirement for the UBC Certificate in Watershed Management.

• Includes three case studies that illustrate the way principles and practices can be applied.

Course Start........................ January 8, 2001
Course Completion............. April 9, 2001
Limited Enrollment. Register early.

What topics are covered?
Course Schedule (Beginning January 8, 2001)
Week 1................... Introduction to Watersheds (CD-ROM Chapter 1)
Weeks 2 & 3........... Methods, Techniques and Tools
(CD-ROM Chapter 2)
Week 4............... Hydrology (CD-ROM Chapter 3)
Week 5............... Sediments & Water Quality
(CD-ROM Chapters 3 & 4)
Week 6............... Water Quality (CD-ROM Chapter 4)
Week 7............... Aquatic Biota (CD-ROM Chapter 5)
Week 8............... Governance (CD-ROM Chapter 6)
Weeks 9 & 10........ Land Use & Watershed Management
(CD-ROM Chapter 7)
Weeks 11 & 12 .......... Case Studies (CD-ROM Chapter 8)
Week 13............. Community-Based Approach
(CD-ROM Chapter 9)
Week 14............. Summary and Conclusion (CD-ROM Chapter 10)

Instructional Team:
Dr. Hans Schreier, Dr. Sandra Brown,
R. Bestbier, Dr. Ken Hall, UBC Institute for Resources & Environment, University of B.C.
RMES 500 Website http://rmes.cstudies.ubc.ca
IRE Website http://www.ire.ubc.ca

How do I register?
If you would like to register for this course for UBC academic credit as Resource Management and Environmental Studies 500B (3 Credits), admission to the University is required to take the course on this basis. Register via telereg. UBC credit students are required to purchased the course CD-ROM separately (education pricing $50 Cdn). For professional non-credit registration in the Institute for Resources and Environment mail, fax or email the application form to: The Institute for Resources and Environment attn Sandra Brown (sbrown@interchange.ubc.ca) fax: (604) 822-9246. Receipts will be issued for income tax purposes.

For more information, visit our website:
http://www.ire.ubc.ca
Or email: bestbier@interchange.ubc.ca
Or email: star@interchange.ubc.ca

METHOD OF PAYMENT
Fee: $600 (includes CD-Rom)
Cancellations are subject to a $50 administration fee. There will be no refunds after Week 3.

☐ CHEQUE or money order (payable to UBC)

REGISTRATION
☐ Please register me in the Integrated Watershed Management course.

FIRST NAME LAST NAME
ADDRESS
CITY POSTAL CODE
TELEPHONE/DAY EVENING
FAX EMAIL
Urban Watershed Management Course

This distance learning course represents a comprehensive approach to urban watershed management. It is intended for community leaders, professionals, and graduate students interested in integrated water resource management in urban areas. It will be offered as a distributed learning course using a CD-ROM textbook which contains the course material, and an Internet Bulletin Board for class discussions, updates and assignments. The course is equivalent to a 3-credit graduate level course and students can register for UBC academic credit as Resource Management and Environmental Studies 500, on a professional development basis, or for credit towards the UBC Watershed Management certificate program.

Course Prerequisites:

A Bachelor's degree in a related field, such as environmental sciences, engineering, planning, geography or biology is recommended. Academic or professional experience related to land and water resource management in an urban context is desirable.

Relation to the Integrated Watershed Management course?

UBC also offers a distance learning course in Integrated Watershed Management, which covers all aspects of watershed management in a more general manner. The Urban Watershed Management course focuses on urban issues and the role of community groups and local governments. The Integrated Watershed Management course is not a prerequisite to taking this course; however, those with limited knowledge about watershed issues are encouraged to take the Integrated Watershed Management course first, since it is an introduction to the topic. There is limited overlap in content between the Integrated Watershed and the Urban Watershed Management Course. The CD-ROM is the multi-media textbook for the course but it can also be purchased separately (see www.ire.ubc.ca/cd-rom)

Instructoral Team:

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Who will benefit?

Practicing professionals, graduate students and others whose work involves water resources management and urban development. The convenience of distance learning makes it particularly appropriate for working professionals who are unable to attend a regular university course.

How do I register?

- You can register for this course on a professional development or certificate-credit basis. Call us at 604-822-1420 or send us the form below via mail or fax 604-822-1599. The fee is Can $ 627 plus $ 100 for the CD-ROM electronic text book.
- You can also register for UBC academic credit as Resource Management and Environmental Studies RMES 500E (3 credits). Call Distance Education and Technology at 604-822-6565. Admission to the University is required to take this version of the course. Current UBC students should contact instructors.

Multimedia CD-ROM features:

- Text equivalent to 500 page book
- 1000 color photographs, drawings and maps
- 30 minutes of video & 1 hour of sound

Computer requirements:

- Pentium 90 or newer; sound card and speakers
- Windows 95 or newer; Internet access
- It will run on some Macintosh computer, depending on PC-compatible software

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