
Student Guide to Graduate Studies

How to Prepare for
your Master's and
Ph.D. Degrees

2nd Edition

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TABLE OF CONTENTS

- Introduction
- 1. Development of a Research Question
- 2. Critical Thinking
- 3. The Conceptual Model or Framework
- 4. The Literature Review
- 5. Office of Research and Office of Research Ethics
- 6. Data Collection, Analysis and Presentation
- 7. The Research Proposal
- 8. The Thesis
- 9. Time Management
- 10. Preparing for a Conference
- 11. Publishing in the Peer-Reviewed Literature
- 12. Getting a Job
- 13. The Curriculum Vitae
- 14. Resources
- Appendices

INTRODUCTION

2nd Edition

The development of this document is an ongoing process, but its main objective is to help guide graduate students at any level throughout their studies. This guidebook was initially developed as part of the Thesis Development II (ERS 670) required Master's course. This course is an interdisciplinary course and thus discusses aspects of biophysical and social research. As a result, this guide also, although very superficially, addresses some aspects of social research and thus is not purely biophysically oriented. The process of writing theses, presenting research results at conferences or writing proposals is the same between the biophysical and social sciences. As such, this guidebook will also be beneficial for those non in the biophysical sciences. Students in this course found the information helpful and as such I decided to slightly revise the course to create this guidebook for my own and other graduate students. The content of this guidebook was re-created from the original lecture slides presented in ERS 670 as such some of the material may overlap or seem repetitive. This guidebook is intended for graduate students in the Department of Environment and Resource Studies at the University of Waterloo, but students from other Canadian universities found it helpful.

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CHAPTER 1: DEVELOPMENT OF A RESEARCH QUESTION

1.1 Finding a Research Topic

The best research will have one or more of these qualities:

- Surprising and unexpected result
 - Result does not always have to be 'significant'
 - Non-significant results can be just as exciting and ground-breaking
- Solves a problem that nobody has solved before
 - More relevant for PhD studies (+ theoretical component)
 - Master's students can take this approach although it is not expected of them. Typically Master's students topics:
 - Repeat an experiment that shows unusual results to see if these results can be replicated (prove of results), or disprove already published results
- Can it prove to work substantially better than other solutions that have been tried before
- Raises some questions that nobody has thought of before

1.2 The Research Niche: Why Find a Research Problem that No One has Addressed Before?

- Gives all the credit to "you" for pioneering this field
- New research areas lead to new questions, new insights and further pioneering work
- New research areas fall into multiple existing research fields
 - Promotes interdisciplinary and transdisciplinary research collaborations
 - Pioneers new research under inter- and transdisciplinary research

1.3 What Kind of Research Question should I Focus on?

Concentrate on solving a clear, real-world problem because:

- More people will care about your solution
- It increases the likelihood you will interact with potential users and leading you to be exposed to a variety of different views
- It is applicable and its MAD
 - **M** = Makes
 - **A** = A
 - **D** = Difference

1.4 How to Find a Research Topic

- Think about a research topic as soon as you begin graduate studies
- Read constantly (books, journals) to familiarize yourself with the important research issues and topics in your discipline
- Make connections between different research topics:
Courses and discussion with course instructors and other grad students in combination with lots of reading will spark many ideas
- If you are not given a topic by your supervisor, then choose a topic that is interesting to you and be realistic in terms of time and the amount of resources needed
- Attend talks/presentations or special lectures on a regular basis
- Record 'all' of your research ideas in a book as soon as you think of them!
- Carefully review any recently published research (review papers are excellent for this) in your discipline and pay attention to the research gaps that are outlined in such publications

1.5 The Best Projects have:

- Incremental results
- Qualities that appeal to more than one discipline
- Small amount of infrastructure required

- Simple statistical analysis

1.6 The Best Projects will have these Qualities:

- Everyone has to cite your work
- There is a 'surprise factor'
- You can convince people your work is important
- Depth – You are the expert
- You are the first to define a new problem
- You are the first to propose a solution to some recognized problem
- You work has a major impact in the field
- Everyone agrees your solution is much better than previous solutions
- You are providing a new tool that allows others to pursue a new solution

CHAPTER 2: CRITICAL THINKING

2.1 What is Critical Thinking

- It is a higher order of thinking
- Focuses on thought such as *how* facts are proven, how arguments are formed, how conclusions are reached. It does not only focus on *what* the facts, arguments and conclusions may be
- It is reflective; testing and questioning your own thinking processes
- It is discipline specific e.g. historical analysis, literary interpretation, mathematical reasoning

2.2 How is Critical Thinking Different

	Critical Thinking	Thinking
Goal	Applying criteria of what you are thinking about and how you are thinking about the topic	To formulate an view or opinion of what you are thinking about
Focus	Based on encapsulating flaws or biases inherent in the facts, data or opinions presented	Gathering information based on facts, examples or data and on opinions or positions
Activity	Questioning and testing the idea and how the ideas are formed, and how you are interpreting the concept.	Making connections between different ideas

2.3 What Defines *Good* Critical Thinking

- The following phrases encapsulate critical thinking
 - Depth
 - Breadth
 - Sound evidence
 - Relevance
 - Consistency
 - Clarity

- Accuracy
- Precision

2.4 The Process of Thinking Critically

a) The Approach

- Basing our thinking in knowledge not feeling (reasoning)
- Focusing on our own and other's assumptions, biases and perspectives (self-awareness)
- Concerned about intellectual integrity (honesty & accuracy)
- Effort on precise and comprehensive work (discipline)
- Are open to consider other points of view

b) Depth & Complexity

- Thinking about the implications and importance of the idea/concept
- Development of questions that help to look deeper (convergence) and broader (divergence) into the topic

c) Answering Questions

- Comparing, classifying, identifying and categorizing the topic into components in order to better understand the topic
 - Making connections between the parts and synthesizing these parts to understand the whole and also to see patterns and relationships
 - Examining the connections and to make inferences about their potential implication
-

CHAPTER 3: THE CONCEPTUAL MODEL OR FRAMEWORK

2.1 What is a Conceptual Model / Framework?

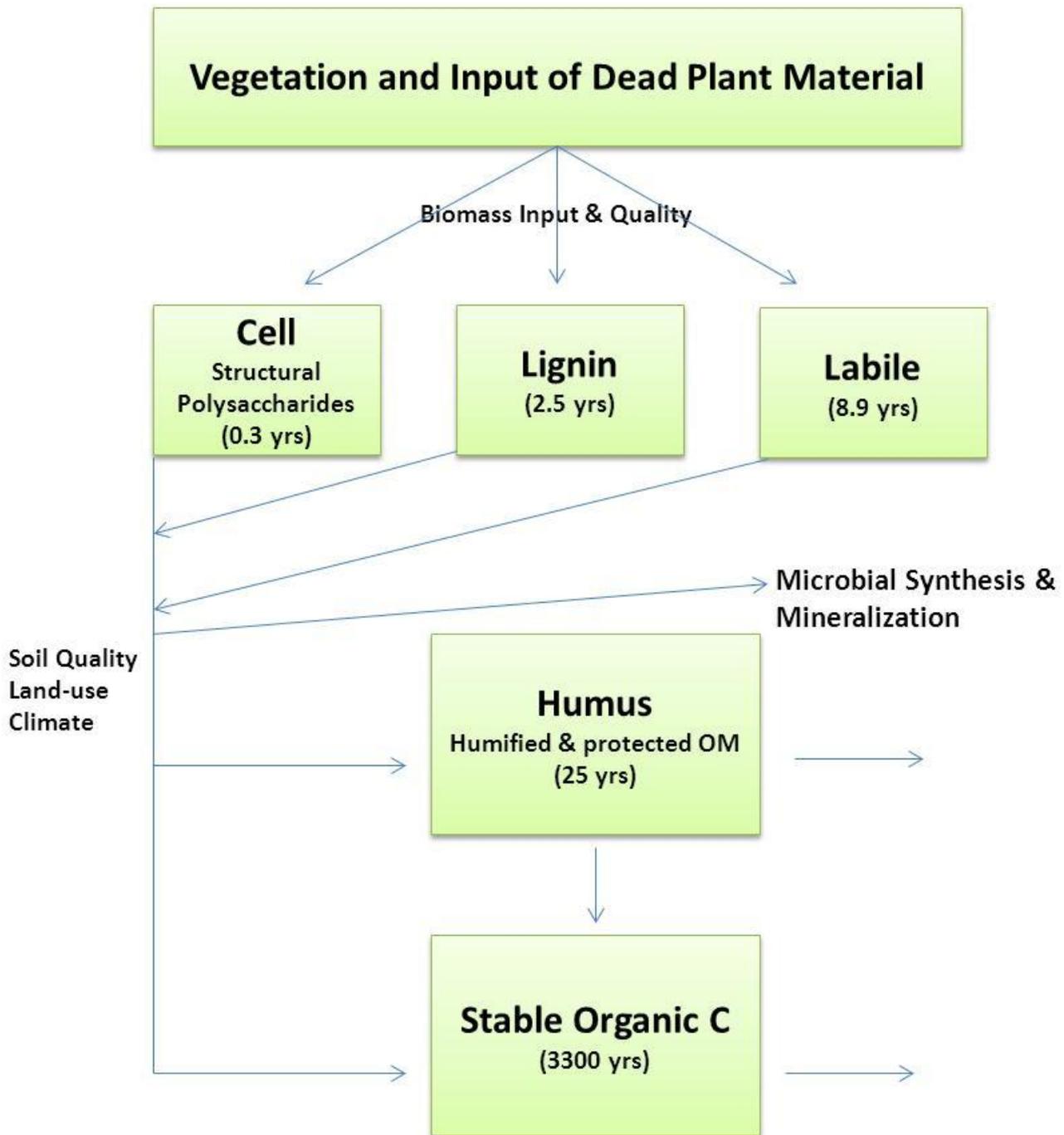
- Presents a preferred approach to solve a research question
- Connects different aspects of the research question
 - Problem definition and purpose of research
 - Literature Review
 - Methodology: data collection and analysis
- It is a map that allows for a coherent understanding of empirical inquiry

2.2 Linking the Research Question and Conceptual Model / Framework

- Once the research question has been developed and a conceptual model was created, the following can be developed:
- Research hypothesis (or hypotheses)
- Research Goal (short and long-term)
- Specific Research Objectives

Example #1:

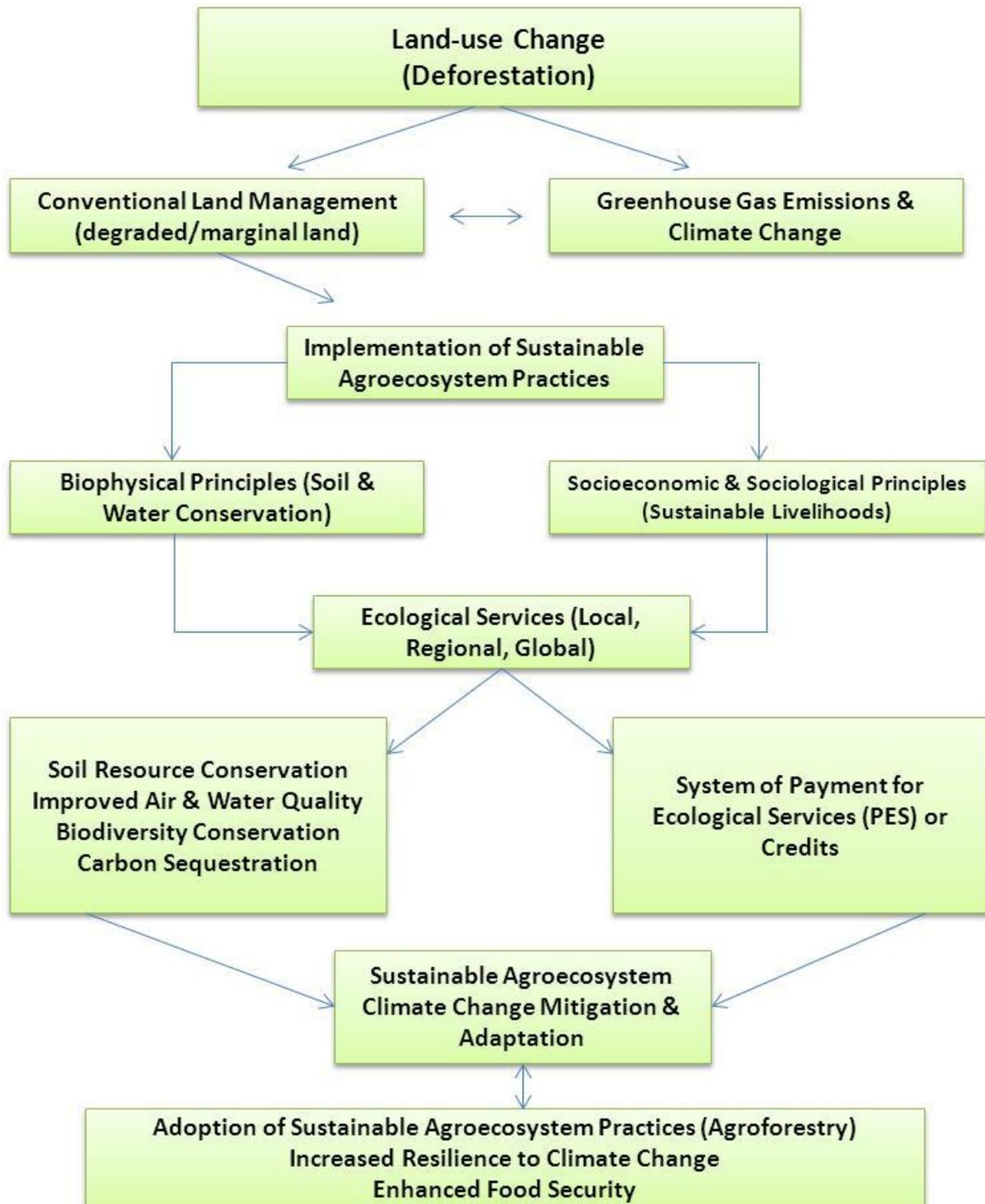
Conceptual Model of the Long-term stabilization of Soil Organic Carbon



(Adapted from Oelbermann et al., 2004. Carbon sequestration in temperate and tropical agroforestry systems: a review with examples from Costa Rica and Southern Ontario. *Agriculture, Ecosystems and Environment* 104:359-377)

Example #2:

Conceptual model presenting the logical progression from deforestation and the creation of marginal land with poor productivity to the implementation of agroforestry systems for climate change mitigation and adaption, while also providing ecological services.



(Adapted from Smith, C., and Oelbermann, M. 2010. Climate change perception and adaptation in a remote Costa Rican agricultural community. *Agricultural Journal* 4:72-79)

CHAPTER 4: THE LITERATURE REVIEW

4.1 What is a Literature Review?

- An account of what has been published on a topic by accredited scholars
- To convey what knowledge and ideas have been established on a topic
- What do we know and what don't we know
- Literature is guided by your research question and objectives
- It is NOT a descriptive list of material available, a summary or a report
- An account of what has been published on a topic by accredited scholars
- Purpose is to convey what knowledge and ideas have been established on a topic: What do we know and what don't we know

4.2 The Literature Review must be:

- Organized around and related directly to the thesis or research question
- Synthesizing results into a summary of what is and what is not known
- Identifying areas of controversy in the literature
- Formulating questions that need further research

4.3 Consider this while Writing the Literature Review:

- Why are you including particular points; how relevant are they?
- Are the arguments clear and easy to follow?
- Are the threads of your argument connected and do they follow a logical sequence?
- Have you included sufficient detail?
- Have you included evidence in support of your view?

4.4 Include the Following in the Literature Review:

- Why your subject is worth researching
 - An overview of your subject, include official definitions if necessary
 - A brief outline of the question(s) you are trying to answer
 - How the topic relates to generally accepted theories in the field?
 - An examination of relevant research carried out on the same or similar topic
 - Evidence that you have thought about & applied the literature to your research topic rather than reproducing other's ideas
-

CHAPTER 5: OFFICE OF RESEARCH & RESEARCH ETHICS

5.1 Office of Research Ethics

- Provides all forms required for research involving animals and humans
- Before beginning any research, appropriate forms must be filled out, and cleared by the Research Ethics Office
- Information on the Office of Research Ethics can be found at <http://iris.uwaterloo.ca/ethics/>
- All relevant information, forms etc. are found on this website.
- You must fill out these forms with your supervisor

5.2 Field Work

- Field work not involving animals or humans may require an environmental impact assessment. This is normally undertaken by your supervisor and the student's responsibility
- Permission to access field site
 - If supervisor does not have access to a research site then the student must work with the supervisor to contact the appropriate land owner(s) in writing to gain written permission to access the field site
 - The type of research and the degree of environmental impact as a result of field work should be outlined in this letter

5.3 Field Work Risk Form (Local Research)

- This form must be filled out prior to undertaking field work
- Students extracting samples or any other type of field work must fill out this form
- This form should be filled out in association with your supervisor
- The form can be found at:
http://www.safetyoffice.uwaterloo.ca/hse/fieldwork/fieldwork_risk_form08.pdf
- If you are conducting interviews for a social science study, it is best to discuss with your advisor and / or the committee if you are required to fill out the Field Work Risk Form

5.4 Field Work Risk Form (International Research)

- If you are conducting work outside of Canada, you must contact the Office of Research International Programs at:
<http://www.research.uwaterloo.ca/international/>
- Must take a Pre-Departure Abroad Orientation
 - This is mandatory and your supervisor and the University will not let you travel (including international conferences) unless you have taken this orientation course
 - These courses are offered only in April, July and December of each year. Ensure you plan ahead to take this course prior to your departure
 - Must contact the International Programs Office personnel to register for this course
<http://www.research.uwaterloo.ca/international/predeparture.html>
 - This site also provides other valuable information including medical/vaccination requirements etc.

5.5 International Field Work: Prior to Departure

- Prior to departure for international field work the following forms **must** be submitted:
 - Completion of "Depart Smart" course. Further information can be found on the Waterloo International webpage
 - Field Work Risk Form
 - Acknowledgement of Risk and Responsibility Form
 - Emergency Information Form
-

CHAPTER 6: DATA COLLECTION, ANALYSIS & PRESENTATION

6.1 Data Collection: Why, What and How?

- Comparing your data to that of others (if available) helps to identify, describe, monitor or evaluate a certain condition / environment / behavior etc.

- Data collection or documentary compilation are techniques that use existing sources of information (in some cases)
- Collect data from:
 - Existing documents
 - Interviews
 - Field collection
 - Integration the above (existing documents, interviews and/or field collection)
- Discuss data collection methodology with your supervisor and advisory committee. Be sure you have the go ahead from your supervisor to use a certain technique(s) for data collection before you actually collect it in the field
- Use conventional techniques so that results are comparable to already existing data
- Many different books (see reading list at the end of this document) exist for data collection for the social and biophysical sciences

6.2 A Word of Advice on Data Collection

- Write down everything!!
- Get a notebook with a hard cover and waterproof; use it as a journal:
 - Record collected data and then transcribe it to the computer
 - Record what you did in the field, problems encountered etc.
 - Record any unusual or usual observations
 - Record any thoughts you may have or have had while in the field; equations required for calculations, diagrams, conceptual models etc.
- Recording everything is important. You will be surprised how much you will rely on this notebook when you are analyzing your data and writing your thesis!!
- Do not rely on electronic equipment!
- Download, transcribe etc. all data collected that day. Do not wait until tomorrow or next week! Data gets lost (or stolen!!!)
- Lost or stolen data cannot be retrieved. This means you have to do it over again!!!
 - This will result in the loss of time and extend your thesis completion date (in some cases without funding)

6.3 Data Analysis

- In the biophysical sciences, data collected from the field may need:
 - To be sorted
 - Analyzed using special instrumentation

6.4 Statistical Data Analysis

Before you collect and analyze any data in the field or from a lab experiment you MUST have in place your experimental design and the statistical analysis you will use!

- **Statistical Analysis: The Incorrect Way**
 - This is the common approach but its wrong!!
 - Student collects data
 - Student wonders what statistical analysis to use on the collected data
 - Often statistical analysis can't be applied to collected data
 - Result: low quality data that is not publishable and should not be presented to the public!

- **Statistical Analysis: The Correct Way**
 - Before any data collection the statistical design is clear and student knows what statistical analyses are to be used before any data is collected
 - Result: high quality data that allows study to be repeated, publishable and presentable to the public!
- In order for your statistical design of the experiment and the subsequent statistical analysis to be effective and correct, it is strongly recommended you improve your knowledge of statistics!
- If you have NO background in statistical analysis, then take a stats course. It wont kill you! It will make you a leading researcher that understands how to collect high quality data!
- Do NOT use Excel!!
 - Excel makes many mistakes in the analysis
 - Excel is very limited in the type of statistical analysis you can do. It is impossible to do a three way factorial analysis in Excel! You can use Excel to make your graphs after you have analyzed the data statistically.
- Learn how to use a statistical analysis program
 - SPSS (social and biophysical sciences)
 - NVIVO (social sciences –interviews)
 - SAS (biophysical sciences – steep learning curve)
 - R (biophysical sciences)
- The UW offers courses on how to use these statistical analyses programs!

6.5 Data Presentation

- Once the data is analyzed statistically; it's time to present it, and there are many ways to do so
 - If you are not sure how to present data, check some of the journal articles in your discipline and use it as a template
 - Do not forget to include statistical differences
 - Ensure proper title description and location (figure descriptions appear below the figure)
 - An excellent guide for proper data presentation is: ***“Communicating in Geography and Environmental Sciences”** Iain Hay and Philip Giles, Oxford Press, Canadian Edition, 2011.*
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CHAPTER 7: THE RESEARCH PROPOSAL

7.1 Contents of a Research Proposal

The entire proposal is double spaced with a font size of 11 or 12, 1” margin all around (unless specified otherwise). The use of titles and subtitles helps to organize the material. All pages must be numbered and use of a header is optional (unless specified otherwise). The following is a general guideline of what should appear in a graduate student’s proposal. If applying for a specific scholarship or grant, then the proposal structure outlined by the granting agency must be followed closely and may not necessarily be the same as that outlined below.

- **Title Page**
 - Project Title
 - Name
 - Date

- **Table of Contents**
- **Summary**
 - Not an abstract
 - Can't write an abstract at this stage of the project
 - Brief introduction (2 to 3 sentences)
 - State the problem (gap in literature)
 - State general objective / goal
 - Where study will take place
 - What will be evaluated
 - Expected outcome
 - Summary / abstract should be no longer than 250 to 300 words
- **Introduction**
 - Review of the literature
 - Length of Introduction varies
 - Depends on granting institution
 - For MES thesis ~ 5 pages (double spaced)
 - Should use subtitles to organize the material
 - No Quotes, No Footnotes!!!!
 - Quote only important definitions (must be referenced)
- **Goals, Research Question, Objectives, Hypotheses**
 - This can be a separate section in the proposal or it can be integrated at the end of the Introduction i.e. after the Literature Review
 - The objectives should be listed in numerical order
 - The objectives must correspond to the research question, goal, hypotheses and literature review (Introduction)
- **Study Site**
 - Provide as much detail as possible
 - Location (latitude, longitude, city, province, etc)
 - Location above sea level
 - Climate characteristics
 - Land-use and surrounding land-use
 - Vegetation type (incl. proper Latin names)
 - Soil type (texture, nutrient content, SOM)
 - Site history (if applicable)
- **Materials and Methods**
 - This section should consist of subtitles if many different methods are used to collect data e.g.
 - Soil sampling and Analysis
 - Vegetation sampling and Analysis
 - Statistical Analyses
 - Describes how the collected data will be analyzed
 - Includes the description of specific statistical tests e.g. ANOVA, t-test, factorial analysis, etc.
- **Expected Results**
 - This is generally a short section and no longer than ½ page

- Description of the results you anticipate from your research
- This is the most speculative section of the entire proposal
- **Milestones (Time Line)**
 - Outlines what you are going to achieve in a certain time period
 - Time frame varies:
 - Yearly milestones (long studies ie. 5 yrs)
 - Includes when you took courses
 - When you begin and end field work
 - Lab and data analyses
 - Writing your thesis
 - Anticipated thesis defense date
- **Budget**
 - This is usually not part of a Master's or PhD proposal for the department or committee but may be required for some scholarship applications
 - Can range from simple to detailed and complex budgets
 - Budget is determined for entire period of study ie. 2 yrs for MES
 - Budgets vary from student to student according to the project undertaken
 - Local vs. international travel
 - Conference
 - Lab analysis
 - Example of a budget is on the next page....
- **References**
 - Use an accepted referencing style
 - Be consistent
 - Within text of proposal
 - In reference section
 - Get help from the library for referencing styles
 - Use style of the dominant journal in your area of research

EXAMPLE OF A SIMPLE BUDGET

Item	OMAFRA Funds	In-Kind Funds	Total Budget
Salaries: Investigators		\$ 95,000	\$ 95,000
Salaries: Grad Students	\$ 114,400	\$ 67,294	\$ 181,694
Travel	\$ 12,000		\$ 12,000
Research Consumables	\$ 32,000		\$ 32,000
Equipment		\$ 112,502	
Communication	\$ 1,000		\$ 1,000
Overhead (25%)	\$ 39,850		\$ 39,850
Overhead (Indirect 15%)	\$ 23,910		\$ 23,910
Total	\$ 223,160	\$ 274,796	\$ 385,454

Detailed Description for Funds Requested from OMAFRA:

Salaries: Investigators

Average salaries for professors at \$95,000 over the 3-year duration of the project calculated for a total project participation at 5 days per month

Salaries: Grad Students

A total of 3 Master's students will take part in this project at \$6929.42/semester for a total of 4 semesters over a 2-year period per student. One Ph.D. student will take part in this project at \$6929.42/semester for a total of 5 semesters over a 3-year period. Funding requested from OMAFRA for graduate student salaries is \$114,400 over a 3-year period. The Department of Environment and Resource Studies will contribute 2 semesters of salary at \$6929.42/semester per student, plus two semesters of funding at \$6929.42/semester will come from additional funds allocated to S. Murphy and M. Oelbermann for a total in-kind contribution of \$67,294. Benefits and vacation pay are included.

Travel:

The requested funds include gasoline for travel to and from the study sites in the departmental van. Each student has also been allocated \$1,500 for conference participation.

Research Consumables:

For each graduate student, a total of \$8,000 has been allocated for sample analysis, supplies and disposables, and the development of the soil health checklist and factsheet.

Equipment:

Instrumentation for greenhouse gas analysis (\$48,500), elemental analysis (\$54,002) will be purchased with a NSERC RTI Grant, and computer equipment and other laboratory supplies (\$10,000) will be purchased with a Start-up Grant to M. Oelbermann.

Communication:

These funds will be used for the Promotion of the Soil Health and Monitoring Toolbox and Factsheet, and to cover any long distance telephone and fax expenses.

CHAPTER 8: THE THESIS

8.1 The Advisory Committee

- The advisory committee in ERS consists of your supervisor plus a minimum of one other committee member from within the department or external to the department for the Master's
- PhD students should check departmental guidelines for the advisory, comprehensive and defense committee
- You should take initiative in approaching your supervisor about a potential committee member(s)
- Establish and complete your first committee meeting by the end of the second semester or beginning of the third semester

8.2 What to Expect from the Advisory Committee

- Advise and guide you along throughout your research, analysis and compilation of your thesis
- The supervisor plays the major role in this process
- The committee is a body of experts in your area of research that is capable to guide you and to ensure you stay on track with your research
- It is your responsibility to take initiative to set-up your first committee meeting with your supervisor
- The committee is there to help you
- It is not a process to intimidate you

8.3 The First Committee Meeting

- Create a Power Point presentation that includes:
 - A bit of background on you

- Introduce to your research topic
- Why you are doing this topic
- Why is it important
- Your research question(s), goal, hypotheses
 - Your study site (if applicable)
- Methods for data collection
- Methods for data analysis
- Timeline of completion
- Ask the committee as many questions as possible on how to proceed with certain aspects of your research that you are not sure about
- The committee members may ask you questions for clarification and to ensure you are on the right track right from the beginning
- You should have at least 1 (one) committee meeting during your MES
- Best to meet early on in your studies to ensure everyone is on the same page
- Its easier to make changes early on in your research rather than later when you are ready to hand in your thesis

8.4 Meeting with Your Supervisor

- Your supervisor (and the supervisory committee) will be major sources of support and guidance
- Consult regularly with them to answer key questions about
 - Your topic
 - Methodology
 - Data collection, proposal development
 - Other facets related to your thesis
- As you progress in your research
 - You develop a level of expertise in your area of specialization
 - Your supervisor may not always be able to answer every question on your topic
 - Your supervisor should be able to guide you in the proper direction throughout this process

8.5 Submitting a First Copy of the Thesis to Your Supervisor

- Think of writing your thesis as a process where sections will need to be completely rewritten multiple times
 - This is the norm and not the exception!
- Keep in mind that your supervisor has to read several theses from his/her different graduate students and from students on which he/she is on the advisory committee
 - Your supervisor may get frustrated easily and reject your work if it is poorly written and there are many grammatical errors
 - You must produce a well-written and complete document otherwise do not submit it to your supervisor

8.6 Some Important Points BEFORE Submitting Your Thesis

- Check with supervisor and committee if they prefer electronic or hard copy
- Follow the UW thesis guidelines
 - Check this link for the University of Waterloo Graduate Thesis Regulations: http://www.grad.uwaterloo.ca/thesis_regs/thesistofc.asp
 - Thesis must have a clear structure (modern vs. conventional) – see below
 - Include table of contents and figures
- Spell check the entire document
- Check for consistency

- Include complete reference list
 - Be consistent with formatting throughout entire thesis
- Ensure that work you cite is diverse and not only from a few sources
- It is not the reader's fault if they don't understand what you are saying
 - Make your writing very clear!
- Other students are the best critics
 - Get them to read your thesis before you submit it
- **Read Strunk and White's "The Elements of Style"**
 - When done, read this book again or use it constantly as a reference if you are not sure on grammar, punctuation etc
- If you have trouble writing take a course
 - Contact the English Language Proficiency Program at UW
 - They offer a variety of writing skills courses
 - This also includes students whose first language is English!!
 - <http://www.adm.uwaterloo.ca/infocs/workshops/writing.html>

8.7 The Thesis!

- Most exciting part of research
 - Allows you to integrate all your ideas and knowledge into one large document
 - Writing a thesis takes time!
 - Organizing your thesis early on will help
 - Make a detailed outline
 - Sections will need to be re-written
 - Edit, edit, edit....
 - Your supervisor will have high expectations
 - Hand-in a well-organized and written document to your supervisor.
 - It should be seen as the final draft as though it is ready for final submission to grad studies instead of submitting an incomplete and sloppy draft

8.7 How to Prepare for Your Thesis

- Use recently produced thesis that were supervised by the same adviser as you have as a template and / or ask your advisor which theses he/she recommends
 - You will find a variation in quality among all the theses your supervisor has overseen
 - Attend final theses defenses of fellow graduate students throughout your graduate program
 - Try to stay for the entire duration of the exam
- Familiarize yourself with the formal procedures and requirements by the Graduate Studies Office and your department
- Review the latest edition of the graduate degree program requirements!
 - This is YOUR responsibility!
- Incorporate all the required formats, font size, margin sizes etc.
 - Format the document before you begin to write the thesis
 - It becomes very difficult (!!) and time consuming to format the entire document after its written

8.8 Keep On Track

- Make a detailed Plan
 - Set goals by when you want to have a certain number of milestones achieved
 - Stick to this plan, no matter what!!
 - Find a conference and submit an abstract for the conference
 - Use this as a milestone for getting work done

- Plan a reasonable amount of time for data acquisition and analysis
- You are expected to be the initiator of the entire process!
 - Force yourself to make progress
 - Press your advisor regularly with new results and issues do discuss
 - Bring specific ideas and questions to weekly or biweekly meetings

8.9 Thesis Design: Modern versus Traditional

There are two different ways to design a thesis (Master's or PhD). The choice of design is up to the student and the supervisor. The modern style may work better for some type of research compared to the Traditional style and vice versa. It is also important to remember that the graduate student should feel comfortable with the style he/she picks as it is his/her thesis to complete and defend. The layout of the two different styles is summarized in the table below. It is also advisable to look at previous and successfully defended theses. This will serve as a guide and help the student decide how to best fit their work into either the Modern or Traditional style. Neither one of these styles is the 'correct way', but it simply is a different way of presenting the work as a whole.

The Modern design is typically used in the biophysical sciences where different experiments are divided up into individual chapters. This style makes it much easier and efficient for submitting papers for peer review since each chapter could be viewed as a single paper that simply needs some refinement before submission to a specific journal. For some students it is easier to organize their thoughts into chapters and in this case the Modern design is most effective for these students. The disadvantage with the Modern design is that it can be repetitive. Care must be taken that the Introduction for each specific chapter focuses solely on the particular research presented in this chapter. This will prevent too much overlap with the Literature Review.

The Traditional design is typically used by those in social sciences, but in some cases it is also suitable for some research projects in the biophysical sciences. This design is less efficient and effective in submitting paper for peer review. If the submission of papers to journals is one of the major goals for the student and supervisor, then it is more advisable to use the Modern design.

It is advisable to decide on either Modern or Traditional design before the thesis writing process begins and stick to this format. Ensure that you have discussed this as well with your advisor. Once the thesis design has been decided, an outline should be made on how the student wants to present the information they have gathered from their research.

8.10 Some Advice on the Thesis

- The thesis is not a big deal as most students make it out to be!
- Be well organized and prepared from the beginning and discuss things frequently with your supervisor (and committee)
- Your supervisor will be pleased to read a well written and organized document that embraces your expertise of research
- Make an effort to hand in the best possible product to your supervisor
 - Treat it as though you want it to read like a book

Example of Modern and Traditional style thesis layout

MODERN STYLE	TRADITIONAL STYLE
<p>Example of Previous ERS Thesis</p> <ul style="list-style-type: none"> ▪ Lisa Dyer, 2010, Evaluation of soil chemical and physical characteristics in a complex agroecosystem in the Argentine Pampa ▪ Matthew Dil, 2011, Effect of nitrogen-enriched biochar on maize (<i>Zea mays</i>) productivity and soil organic carbon 	<p>Example of Previous ERS Thesis</p> <ul style="list-style-type: none"> ▪ Beverly A. Raimbault, 2011, Litter input, soil quality and soil CO₂ production rates in varying riparian land-uses along a first order stream in southern Ontario ▪ Carolyn E. Smith, 2008, Encouraging climate change adaptation through payment for environmental services: Case studies in the Pacific region of Costa Rica
<p>Introduction</p> <ul style="list-style-type: none"> ▪ Very brief introduction to the entire topic ▪ Includes goal and general objectives ▪ No longer than 1.5 to 2 pages ▪ Usually has a few references 	<p>Literature Review</p> <ul style="list-style-type: none"> ▪ Detailed review of the literature ▪ Specific research question, objectives and hypotheses are stated at after the literature review
<p>Literature Review, Research Question, Objectives, Hypotheses</p> <ul style="list-style-type: none"> ▪ Detailed review of the literature ▪ Specific research question, objectives and hypotheses are stated at after the literature review 	<p>Study Site</p> <ul style="list-style-type: none"> ▪ Detailed information on the study site (see information above under Research Proposal)
<p>Study Site (if applicable)</p> <ul style="list-style-type: none"> ▪ Detailed information on the study site (see information above under Research Proposal) 	<p>Results</p> <ul style="list-style-type: none"> ▪ Results presents ALL results in this section and these results are cross referenced to all tables and figures that also appear in this section ▪ Subtitles should be used for this section
<p>Chapter 1</p> <ul style="list-style-type: none"> ▪ Introduction and specific objectives for this chapter ▪ Materials and Methods on sample collection and analysis including statistical analysis (information about the study site is not needed) ▪ Results (includes all tables and figures that are cross referenced in the text). ▪ Discussion ▪ The Materials and Methods, Results and Discussion sections can contain subtitles that correspond to each other in each of the different theses sections ▪ Literature Cited (optional – a reference list specific for each chapter can be placed at the end of EACH chapter or one entire reference list can appear at the end of the entire thesis) 	<p>Discussion</p> <ul style="list-style-type: none"> ▪ A discussion of all research results ▪ Subtitles are used in this section

Chapter 2 ▪ Same outline as for Chapter 1	Literature Cited/References
Chapter 3 etc ▪ Same outline as for Chapters 1 and 2	Appendices (if applicable)
Chapter 4: Overall Conclusions and Future Research ▪ Brief summary of the findings of each research chapter (eg. Chapters 1 to 3) and then provides a overall Conclusions and Future Research Section	
Literature Cited / References	
Appendices (if applicable)	

CHAPTER 9: STRATEGIES IN TIME MANAGEMENT

- Developing time management skills needs to be learned and practiced
- It is to help you become more aware of how you use your time to organize, prioritize your research
- There are many books and even software that can help you with effective time management and organization of your research. Take advantage of these!

9.1 Time Blocks & Breaks

- Develop a weekly schedule that organizes your courses, time for literature review research, time for work in the laboratory, time needed as a Teaching Assistant (TA), meetings with your supervisor, extracurricular activities, social events with friends & family etc. Stick to this schedule as much as you can.
- In your schedule you also need to incorporate study breaks. For example, if you are intensely studying for your comprehensive exam, you should incorporate a 5 minute break every 20 minutes. During this break you should get up and leave the study area (get a coffee/tea, check email, get some fresh air, do stretching exercises).

9.2 Study/Work Space

- The place where you study, read research articles or write your thesis should be away from distraction (of any kind!) where your concentration can be maximized
- This should be your area where you can spread/sprawl and organize your desk
- Studying on your bed is not a good idea because you will be much more prone to get distracted or fall asleep than when sitting at a desk

9.3 Reviewing & Organize

- Review your material from courses weekly and organize your time accordingly to complete assignments

- Organize all of your research papers accordingly so that you can retrieve them easily when you need them
- Some students organize their papers according to specific contents that is related to their research

9.4 Prioritization & Postponing (Procrastination)

- It is a good habit to start off with the most difficult subject or task that is part of your research. Because this is the most difficult subject for you, you will need to spend more time on it. Make sure you take regular breaks from reading/studying.
- Learn how to postpone tasks that are not high priority and can be easily done at a later time
- Many students procrastinate to start writing their thesis or study for the comprehensive. This is a dangerous route as this could extend the length of time you are in graduate school which also means you have to pay more tuition.

9.6 Resources

- There are resources to help you with many things such as organizing your work, how to plan your time using time management software, to help you with your statistical analyses, to help you understand concepts.
- This is why it is important to regularly meet with your advisor. He/she should ensure you are on track and on time at each specific stage of your graduate degree.
- Fellow graduate students are also a great resource to help you edit an assignment or your thesis. But you have to allocate sufficient time for them to be able to go through your work.

9.7 Free Time

- As a graduate student it is important that you interact with your fellow grad students. This time should be used to discuss some important concepts of your and their research, which will also help to enhance your critical thinking skills (in addition to learning something new).
- Use your free time to devote to your hobby. It is important to stay physically active during your career as a graduate student (and thereafter) to maintain a healthy life-work balance.

CHAPTER 10: PREPARING FOR A CONFERENCE

A conference is the gathering of experts in a specific discipline presenting the latest research findings either orally or through a poster. Students should strive to go to a conference to present their latest research findings to others in their discipline. Conferences also provide an opportunity for other researchers to get to know you and your work – you are making a name for yourself! It is highly recommended that you participate in a conference as a Master’s student, especially if you are continuing to a PhD and into academia. As a PhD student you should attend several conferences throughout your studies. For Master’s students, a conference usually occurs in their second year, once they have already gathered and analyzed this data. This is also good preparation for the thesis defense!

If you are not sure which conference to go to, discuss this with your supervisor. Your supervisor will also advise you if you are ready for a conference and point out which conference may be most

suitable. Typically there are annual or biannual meetings of certain societies eg. see Canadian Society of Soil Science,

The University of Waterloo also holds an annual Graduate Student conference (<http://www.grad.uwaterloo.ca/conference/>) in which students in their first year of study, without any real research results can participate. The various research Centers such as IC³ and The Centre for Ecosystem Resilience also hold annual Student conferences. It is encouraged that students participate in these on campus conferences in order to get used to presenting their work in front of an audience.

10.1 Steps for Going to a Conference

1. Determine which conference to go to
 - Check with supervisor if there is funding to send you to the conference or
 - Check for available scholarships to go to a conference
2. Find out deadline for submission of abstract
3. Submit abstract by deadline
 - Get your supervisor to look over the abstract before you submit it
 - They have specific instructions regarding length and formatting of abstract
 - If you miss the deadline you miss out on participating in the conference
 - Indicate poster or oral presentation (discuss this with your supervisor)
4. Check conference website regularly for updates and deadlines
 - Registration deadline
 - Hotel registration deadline
5. Start preparing your poster or presentation
 - More on posters / presentations later in the lecture
 - Go over poster / presentation with supervisor
6. Prepare for departure
7. Attend conference
 - Dress respectably at the conference and dress professionally during oral and / or poster presentations (suit and tie may be overkill but it depends on your field of research). It may be good to ask your advisor what the dress code is at specific conferences (don't be shy to ask; your advisor will gladly help you with this)
 - Bring lots of business cards
 - Bring copies of your resume/CV
 - Make lots of connections (for PhD studies, jobs, internships)
 - Be enthusiastic – especially about your research
8. Have fun chatting with other grad students and professors in your discipline.

10.2 The Oral Presentation at a Conference (and Elsewhere)

- Title slide
 - Name(s), university, department, country
 - Introduction
 - Introduce topic
 - State problem
 - What you are investigating (question and objectives)

- Study Site
- Materials and Methods
- Results and Discussion
- Conclusions
- Acknowledgements

10.3 Tips for Oral Presentations

- Some conferences provide guidelines on the oral (and poster) presentations
- Length of presentation
 - E.g. 12 minutes presentation
 - E.g. 3 minutes questions
 - Practice, practice, practice to ensure you are within the time limit
 - They will cut you off if you go beyond the limit
 - It is considered rude and unprofessional to go beyond the allotted time limit!
 - Be prepared to answer questions and be enthusiastic
- Be professional (dress appropriately)
- Practice your presentation many times to ensure it can be finished on time
- Use a pointer (laser or other)
- Speak clearly
- Make eye contact with the audience

10.4 The Poster Presentation at a Conference

- To communicate your research results to the public
- At a conference, there are specific times when the poster author has to be present to answer questions
 - Therefore dress appropriately
 - Show enthusiasm for your work
 - Be prepared to answer questions
 - Can provide 8.5" x 11" copy of poster for conference attendees to take with them
- About 40% (no more) of the poster content should be written
- 60% or greater of content should be graphical format
 - Graphs
 - Tables
 - Charts
 - photos
- The contents of a poster are the same as that for the oral presentation

10.5 How to Make a Poster

- *See Appendix 1 for tips on effective poster creation*
- Power Point or Corel Draw
- Poster size
 - Check with conference organizers for exact dimensions
 - There are often specific and limits to size and design
 - Can be printed on campus (expect to pay +\$60/poster)
- There is ample information on the internet on how to construct a poster
- Take a look at some posters displayed in the hallways of our buildings
- Be critical on what is a good poster and a bad poster

10.5 Conference Etiquette (Important Points to Remember)

1. Mark your calendar and plan ahead before the conference begins

2. When entering the room where you will give the presentation, introduce yourself (and shake hands) with the convener of the conference session. Your handshake needs to be firm and steady which will transmit confidence and strength
3. Be able to express who you are and what you do/what your research is on in less than one (1) minute
4. Smile! You need to be serious and professional but you also have to be pleasant and approachable – make sure you express this in your body language
5. Do your homework – before the conference see who is participating and learn to associate the name with the person; be prepared to approach this person to chat about his/her research and yours.
6. Be realistic in your abilities – do not overindulge and give those that you meet you are superhuman and able to do anything.
7. Move around and speak to as many people as you can and hand out your business cards
8. Come prepared with notebook and pen to the different oral and poster sessions
9. Do not take up all of the seats in the conference room. Be courteous and move over or remove your briefcase from the seat next to you if someone wants to sit there. This is especially important if there are only a few seats left.
10. Be polite, sincere and firm
11. Wear your namebadge. The namebadges have a nasty habit of turning over so your name and institution are not visible. Instead pin your namebadge on the right side of your clothing (as it is easier to read on the right when you are shaking hands)
12. Remember the basics of etiquette at meals: introduce yourself to everyone at the table; do not reach over the table to shake hands but move over to the side of the table to the person you are introducing yourself to; do not eat until everyone at your table is served; if you are waiting for a special meal let everyone know that it is o.k. for them to start eating because your meal will be late

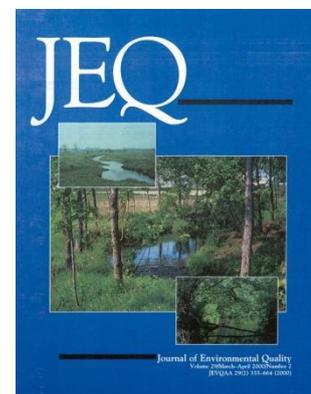
CHAPTER 11: PUBLISHING IN THE PEER-REVIEWED LITERATURE

11.1 Elements of a Research Paper: Why Publish

- To disseminate your results to the research community in your discipline
- To enhance your resume
- If considering PhD studies and an academic career it is vital you publish
 - Publish or perish!
 - Master's: 1 to 2
 - PhD: 3 to 5

11.2 Where to Publish?

- High impact peer reviewed journals
 - Impact determined by “Impact Factor” (IF)
 - The higher the value of the IF the higher the impact of this journal
- IF's often stated on the journal's home page
- Consult with your supervisor which journal is best suited to your discipline
- Open-source journals are also an acceptable way to publish. But be aware that some of these journals have a much lower quality standard than non-open-source journals. It is a



good idea to look at the editorial board of an open journal. If the editorial board members are high profile academics, then the journal will likely have a higher standard and should be considered for publishing your work.

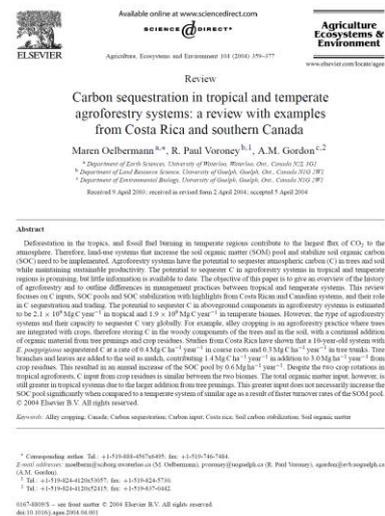
11.3 The Peer Review Process

- The submitted article is reviewed by peers with expertise in your field
- Review is either:
 - *Open Review*
 - Author's and reviewer's names are presented
 - This is rare and unusual
 - *Blind Review*
 - Authors don't know the reviewers names but reviewers know authors names
 - Most common type of review
 - *Double Blind Review*
 - Authors and reviewers names are withheld
 - Several journals have gone this route as it presents less bias

11.4 Contents of a Publication

- *Title Page*
 - Name of authors
 - Contact Information and name of corresponding author
- *Abstract*
 - Length depends on author guidelines
- *Introduction*
 - 2 to 3 double spaced pages
 - Includes a clear statement of the objectives and in some cases the hypothesis
- *Materials and Methods (with an example of subtitles)*
 - Study Site (subtitle)
 - Detailed description of the location of the study site (latitude, longitude), description of climate (average annual precipitation, average annual temperature), height above sea level, information on soil (texture, soil classification, soil chemical characteristics etc) and vegetation
 - In some cases, a brief description of the surrounding land-use may also be appropriate
 - Detailed description of the study design e.g. CRD, RCBD, split-plot, etc. with a clear description of the different treatments and the number of replicates
 - Soil and Plant Sampling (subtitle)
 - Describe exactly how soil and plant samples were extracted, processed and handled and how the samples were analyzed (include the chemical methods)
 - Soil and Plant Nutrient Analysis (subtitle)
 - Soil and Plant Stable Isotope Analysis (subtitle)
 - Statistical Analysis (subtitle)
 - Detailed description of the statistical analysis, and the analysis program used.

- Should include if the analysis as an ANOVA and if it was a factorial, then evaluation of simple and main effects and the type of multiple comparison tests used
- **Results**
 - Use the same subtitles as in the Materials & Methods
 - Write results only, do not include any elements of the Discussion here
 - Normally significant results are presented only
 - Results in the text must be cross-referenced with figures and tables
- **Discussion**
 - Use the same subtitles as in the Materials & Methods if appropriate. In some cases, there may be no need to use subtitles in the Discussion
 - Generally, no new data (results) is added to this section
- **Conclusions**
 - 1 to 2 paragraphs (no longer than 1 page double spaced)
 - Should summarize the most important findings and tie these back to the objectives of the study
 - A statement on future studies that should take place based on the findings of your study can also be added
- **Acknowledgements**
 - Funding agencies
 - Field assistance
 - Statistical assistance etc.
- **References**
 - Follow style of journal
 - The journal style is outlined in the Author Guidelines available on the journal's website
- **Tables**
 - Each table is on a separate page
 - Table captions on top of Table
 - Tables must be numbered eg
Table 1: Table description
 - Do not say Table 1 describes...in the text of the manuscript (this is not very professional and most reviewers look upon this style negatively)
- **List of Figures or Figure Captions**
 - Figure 1: description of Figure 1
 - Figure 2: description of Figure 2
- **Figures**
 - Each figure is displayed on a separate page
 - No captions needed since these are in the List of Figures
 - Some comments on Tables and Figures



- Tables and Figures should be stand-alone; this means that the reader should understand the results presented without having read the entire manuscript.
- This means that the Table and Figure captions should be sufficient. It is not acceptable to say: Figure 1 – Map of the study site; instead: Figure 1 – Location of the study site in Waterloo, Ontario Canada outlining the location of the study plots and the no-till and conventional tilled treatments.

11.5 Formatting the Final Product

- Each journal has its specific style of formatting for titles, subtitles, units, references, length of abstract, etc.
- The home page of the journal you want to publish in has “*Author’s Guidelines*” which you must follow closely
- If you do not follow formatting requirements the publication can be rejected on this alone without considering the validity of its content!
- You should include line numbers (continuous) and page numbers on your manuscript regardless if the journal formatting mentions that these are required or not. Same goes for page numbers.

11.6 Submission Process

- Write the paper and edit it at least 10 times
- After editing it at least times, then give the paper to your supervisor for further editing
- With your supervisor, think of names for possible reviewers (3 to 5 names)
- Double check if manuscript is formatted according to the journal and check for consistency throughout manuscript
- Go to journal home page
 - Register for journal submission
 - Note your supervisor may already be registered
- Follow steps for online submission
- You will get an acknowledgement of manuscript submission/received
- Wait for weeks and months
- The journal editor will get back to you with a decision
 - Reject
 - Major Revisions
 - Minor Revisions
 - Accepted
- The reviewers provide detailed information on how to improve the manuscript

11.7 The Process of Responding to the Reviewer

- Integrate all of the reviewer’s suggestions into the manuscript
- Make a note on each reviewer’s suggestion on how you addressed these suggestions
- Write cover letter to the editor stating in detail per page number and line number
- Submit article again to the same journal if major or minor revisions were required
- Do not follow steps 12 and 14 if the manuscript was rejected. Submit it to another journal.
- If Major or Minor revisions are accepted the editor may still ask for additional small improvements before submission to typesetting
- Receipt of galley proofs
 1. The type-set manuscript as it will appear in the journal
 2. Double check for accuracy and address all publishers comments
- Final product

11.8 Order of Names on the Manuscript

- This is sometimes controversial of who gets to be first!
- If the student did all the work including writing the manuscript then his/her name is first followed by the supervisor
- If the student did not write the manuscript but the supervisor did, then typically the supervisor (or whoever wrote, submitted, edited) is first

11.9 More Comments and How to Cope with Rejection

- Writing and publishing a manuscript is a LOT OF WORK!!!
- This is not a one day process
 - The entire process may take 1 to 1.5 yrs!
- The process is faster if:
 - Student does a superior job of data analysis
 - Student does a superior job of writing the results and discussion
 - Student has superior writing skills
 - Manuscript is consistent in formatting etc.
- Rejection of manuscripts is the norm rather than the exception
- Get used to having your work rejected
- It may get rejected three or more times from different journals
- Keep trying and eventually it will get accepted by a journal
- Always try to submit to high quality journals first and then work down the ladder including open-source journals

11.10 Some Words on Bibliometrics

- There are several resources available that evaluate your research based on the number of publications. This is somewhat important if you are planning on continuing in a Ph.D. and a career as an academic. It is becoming more commonplace to compare the H-index of candidates applying for an academic position, or those going through tenure and promotion.
 - There are many issues with using programs like Thomson-Reuter's Web of Science, Google Scholar as they do not index all journals. For example, book chapters, books, open-source journals and journals that are very regional or country-specific are not indexed. For example, if you have a total of 10 publications the Web of Science may only show that you have 4 publications. This is because they only index certain journals. However, if you compare your work on Google Scholar, it may cite 9 publications and may not have caught the 10th publication which was a book chapter.
 - Be aware of this, as you may come across this again in your academic career.
-

CHAPTER 12: GETTING A JOB

12.1 Make Yourself Employable

- Prepare a CV for an academic related job or a resume for any other job related to the private and public industry. There are many books and information is available online on how to construct a CV or a resume.
- Be prepared to list referees, and carefully choose your referees. Choose a referee that can provide a detailed evaluation of your work.

- You should always check or let the person(s) know that you are listing them as a referee. You do not want any surprise calls to your referee and catch them off-guard if a potential employer calls for further information on you.
- Get as much experience in research and teaching as you can. This will be of great benefit. If your research involves an industrial partner then this will be an excellent opportunity for you to flag in your CV/resume that you have experience outside of the academic world.

12.2. Looking for a Job

- Apply as widely as you can. There is a so-called ‘lottery effect’
- Check job postings regularly. Use all of the resources at your disposal including social media. It is important to.
- Word-of-mouth is often the best resource.
- Let your supervisor, other professors, fellow graduate students, etc. know you are looking for a job.

12.3. Applying for a Job

- Read the job description carefully and tailor your cover letter and resume accordingly
- Highlight relevant information
- Be prepared for rejections but don’t give up

12.4 Interviews

- Organize and practice dummy interviews
- There are a wealth of typical interview questions available online
- Be prepared to talk about yourself – strengths and weaknesses. Be positive
- Answers should be a few sentences in length not a few minutes in length
- Do not assume people are experts in your area of research or know your specific research topic in detail
- Be polite in interviews (read about interview etiquette), show respect
- Don’t be afraid to ask for a clarification in the interview for example if there is a question that you did not understand
- They may ask if you have any questions (this is not the time to ask about salaries!). They expect a potential hire to have questions. So prepare your questions beforehand (before the interview).
- Don’t be thrown off by rude interviewers
- Don’t ask about the salary until you actually have a job offer (and then you can also negotiate your salary)
- If you are asked if you would take the job offer, enthusiastically say yes (you have the right to consider whether you accept or not but that should be decided after the interview and sleeping over it for a couple of nights)
- Be prepared to think on your feet and answer challenging questions and engage in challenging conversations
- Relax! The interviewers are also asking themselves if they are going to enjoy having you around; so showing them you are confident, enthusiastic and relaxed is important

CHAPTER 13: THE CURRICULUM VITAE

The curriculum vitae (CV) is used by those who have completed a Master’s or Ph.D. and are interested in pursuing an academic career e.g. continuing as a Ph.D. student or a post-doctoral fellow, which eventually lead into an academic position. Your CV will always be a work in progress.

A CV is a profile of your entire academic achievements, publications, scholarly activities, as well as the skills that you developed throughout your academic career including related teaching and research experience. Unlike a resume, a CV does not have a specific number of pages. Generally, as you progress in your academic career, the number of pages of your CV increases. It is expected that as a Master's student the number of pages will be less than that of a PhD student. Likewise, an early career researcher will have a shorter CV than a mid-career and late-career academic.

There are some key elements that need to be included in the CV (see below). Note that the CV should also be discipline specific and some of the headings outlined below may not be sufficient. Depending on the position you apply for, you should also consider tailoring your CV.

Other points to consider for your CV:

- Font size – no smaller than 11 points
- Keep it simple – do not use too many different font styles
- Visually pleasing – use sufficient spacing to highlight the different sections of your CV
- Keep it consistent – like your thesis, proposal and research paper, the style of the CV should also be consistent with respect to major headings and subheadings.
- Name it – place your name on the leader of each page along with a page number
- Individualize it – make your CV sufficiently individualized so that it does not look like a generic template.

13.1 Sections of the CV

The following categories should appear on your CV, but keep in mind that your CV is discipline-specific and may include other categories not discussed in this guide. It may be helpful to ask your advisor for his/her CV so you can get an idea of its content (note that your advisor's CV will likely have many more pages due to his/her advanced career stage compared to yours – do not let this intimidate you; instead use it to learn and see what type of activities you should be involved with in your future academic career).

The outline below includes headings that a professor would use in his/her CV. Some of these may not be applicable to a Master's or Ph.D. level CV. Note that 1., 2., 3, etc. are main headings in the CV whereas a, b, c etc. are subheadings under the main heading.

1. Contact Information

(Include your current affiliation, preferably not your home address, email and website)

2. Professional Background

- a. Appointments *(refers to the current position e.g. Assistant Professor)*
- b. Education *(state your education including the current degree you are working on and include expected completion date)*
- c. Certification *(any certification e.g. university teaching certificate etc.)*
- d. Honours and Awards *(the subtitle Scholarships may be more appropriate for graduate students)*
- e. Languages *(list any language skills and your ability with this language in terms of written, oral and reading)*

3. Research Related Activities

- a. Research-Related Employment *(not needed for graduate students)*
- b. Professional Development *(any courses you took e.g. how to write a grant etc. that relate to improving your research abilities)*

- c. Theses (*list all of your thesis including the one you are working on currently*)
- d. Peer-reviewed Publications (*list all of your peer-reviewed publications that are currently available, in press, under review and forthcoming*)
- e. Books and Book Chapters (same as d.)
- f. Conference Proceedings (same as d.)
- g. Non Peer-Reviewed Publications (*any publications you wrote for e.g. Nature Canada, National Geographic etc.*)
- h. Technical Reports
- i. Conferences (*list all oral and poster presentations on which you were an author – designate in brackets if it was an oral or poster presentation*)
- j. External and Internal Research Funding Received (*list any research grants you have received; include all authors, title of grant, granting institution and amount received*)
- k. External and Internal Research Funding Pending (*same as j. except that these are grants currently awaiting decision*)

4. Teaching Related Activities

- a. Course Contributions (*list the courses include course number and name, include year, title if taught only by you or co-lectured*)
- b. Teaching Assistantships (*list the course, including year, name of course and course number that you have TAed*)
- c. Undergraduate and Technician Supervision (*any supervision – may be more appropriate for Ph.D. and post-doc*)
- d. Graduate and Visiting Scholars Supervision (*applicable for post docs and professors*)
- e. Graduate Student Committees and Exams (*applicable for post docs and professors*)
- f. Invited Lectureships (*list any presentations for which you were invited*)
- g. Professional Development (*list any activities that helped promote/improve your teaching ability*)

5. Professional Service and Consulting Activities

- a. Departmental Level (*sections a., b., c. and d. are likely more appropriate for post-docs and professors. As graduate students you may want to make this into one subtitle that outlines some of the activities e.g. student council or other committees you served on*)
- b. Faculty Level
- c. University Level
- d. Provincial, National and International Level
- e. Consulting (*list any consulting activities with private industry, general public etc. – these activities do not have to be only those for which you got paid*)

6. Journal Editorships and Reviews (*relevant for post-docs and professors*)

- a. Editorships
- b. Journal Article Reviews
- c. Book Reviews
- d. Conference Organization

7. Community Outreach and Extracurricular Activities

(Any outreach or involvement with community groups can be listed here. You can also make several subtitles under this main heading depending on the type of community outreach/extracurricular activities you are/were involved with)

CHAPTER 14: RESOURCES & APPENDICES

How to Write an Exceptional Thesis or Dissertation: A Step-by-Step Guide from Proposal to Successful Defense. 2011. Atlantic Publishing Group. ISBN-10: 1601386036

Bui, Y.N. 2009. How to Write a Master's Thesis. Sage Publications. ISBN- 10:1412957109

Booth, W.C., Colomb, G.G., Williams, J.M. 2008. The Craft of Research (3rd Edition). University of Chicago Press. ISBN-10: 0226065669

Carter, M.R., Gregorich, E.G. 2007. Soil Sampling and Methods of Analysis (2nd Edition). CRC Press. ISBN-10: 0849335868

Jongman, R.H.G., Ter Braak, C.J.F., van Tongeren, O.F.R. 1995. Data Analysis in Community and Landscape Ecology. Cambridge University Press. ISBN-10: 0521475740

Ford, E.D. 2000. Scientific Method for Ecological Research. Cambridge University Press. ISBN-10: 0521669731

Patil, G.P., Gore, S.D., Taillie, C. 2011. Composite Sampling: A Novel Method to Accomplish Observational Economy in Environmental Studies. Springer. ISBN-10: 1441976272

De Graaf, H.J., Musters, C.J., Tier Keurs, W.J. 2010. Regional Opportunities for Sustainable Development: Theory, Methods and Applications. Springer. ISBN-10: 9048152135

Chan, S.S. 2007. Environmental and Ecological Statistics with R. Chapman and Hall/CRC Press. ISBN-10: 1420062069

Luellen, W.R. 2001. Fine-Tuning Your Writing: Advanced Techniques for scientists, engineers, physicians and other professionals. Wise Owl Publishing Co. ISBN: 0-9709415-0-1

Van den Hoonaard, D.K. 2012. Qualitative Research in Action: A Canadian Primer. Oxford University Press. ISBN: 978-0-19-543919-9.

Hay, I., Giles, P. 2011. Communicating in Geography and the Environmental Sciences. Canadian Edition. Oxford University Press.

Toth, E. 2009. Ms. Mentor's New and Ever More Impeccable Advice for Women and Men in Academia. University of Pennsylvania Press.

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APPENDIX 1: STEPS TO AN EFFECTIVE POSTER

A good poster enables the reader to grasp the message in a short time, e.g. less than a minute. If he finds the subject of interest he will stay to learn about the details, and discuss the work with the presenter. If you fail to get the reader's attention in a short time, he is likely to go on to the next poster, unless he really wants to know about your work.

Message of the Poster:

Try to formulate the essence of what you want to present in a single sentence. Examples:

- *The conversion of forest to agroecosystems results in the loss of soil organic matter*
- *Intense cultivation practices reduces levels of soil organic carbon*
- *Loss of soil organic matter reduces the soil's potential to sequester carbon*

Introduction: Write a few sentences of introduction to identify the problem you address, what is known about it, the objectives of your work and what your approach is to investigate the problem. Use short sentences and keep this section as concise as possible.

Study Site (if applicable): Include all relevant biophysical information about the study site, including photos.

Results: Select the most pertinent/necessary results that support your message. Think about attractive ways to present the data in figures. Try to avoid tables as much as possible. Figures and captions should be easy to read. Consider adding a brief conclusion below every figure.

Conclusions: Write the conclusions in short, clear statements (point form). Finish with an assessment of what you have achieved in relation to your objectives, and future research needs.

Getting your Poster Noticed: How are you going to draw attention to your poster? An attractive title serves as such to some extent, but is not enough. Select one of your most important results, a photo, a scheme explaining the scientific background, a model or the main conclusion, or whatever you consider as highlight of your presentation and give it a prominent place on your poster, for example in the middle or at the beginning. It should raise interest and stimulate them to read your poster.

Layout: Arrange all the parts of the poster around your attention getter. Add headers if necessary to clarify the structure of your poster, and add everything else that is needed, such as literature, acknowledgements. Ensure that author name(s) and affiliation are on the poster.

Review and Revise: Ask your co-authors and/or colleagues to comment on a draft version of your poster. Assess very critically if the poster indeed conveys the message you want.

APPENDIX 2: MES Program Overview for the Department of Environment and Resource Studies, University of Waterloo

The following information was taken from the ERS Website:

<http://www.environment.uwaterloo.ca/ers/grad/current/MESProgramoverview.html#Advisor>

MES (Master's of Environmental Studies) Program Overview

Masters Program Degree Requirements

Each student must

- complete ERS 669 Team Research Project, ERS 670 Thesis Development and ERS 680 Implications of a Sustainable Society for Environment and Resource Studies; Milestone: Thesis/research agenda statement

- complete two one-term elective courses; maintaining an academic average of at least 70%; and
- complete and successfully defend a Masters Thesis

The minimum period of full-time enrollment is three terms (one year) or its equivalent. Normally degree requirements are to be completed within a maximum of six terms (two years) for full-time study or within 15 terms (five years) for part-time study. Most full-time students complete their course requirements within their first two terms and are prepared to begin thesis research in their third term.

For further information regarding university regulations see Minimum Requirements for the Masters degree as set out in the Graduate Calendar

<http://gradcalendar.uwaterloo.ca/page/GSO-Masters-Min-Req>

The Advisor and Committee

Each student in the ERS masters program will have an advisor (or two co-advisors). Each advisor (or at least one advisor where there are co-advisors) must be a regular or cross-appointed member of the Department of Environment and Resource Studies. Adjunct ERS faculty members may act as co-advisors. In addition to the advisor there will be a committee member who is normally identified by the end of Semester one.

Masters students typically have a two person committee (the advisor and one other faculty member) and then will have a reader assigned when he/she is ready to defend and submit the thesis. The reader must have been at arms length from the students thesis preparation process. The three person thesis examination committee must have at least one member external to the Department of Environment and Resource Studies. The thesis should normally be on public display for two weeks (10 business days).

The Courses

ERS Masters students must take at least five courses, including three core courses (ERS 669, ERS 670 and ERS 680) and two elective courses, maintaining an overall average of at least 70%. The electives will be graduate courses chosen in consultation with the student's advisor.

The three core ERS Master courses are:

ERS 669 Team Research Project

A team project to demonstrate problem definition, analysis and interdisciplinary research methods in environmental studies. The course will provide an examination of different modes and methods of analysis to be used in projects and thesis-based research. Students will also learn how to prepare and write proposals to granting agencies.

ERS 670 MES Research Development

The goal of the course is to ensure that all students will have a completed thesis proposal by the end of term. Each student will make an oral presentation of their proposal to their committee members and other members of the Department and the Faculty. The course will include discussions about how best to frame a good research question, find sources, organize a thesis, conduct ethical research, and communicate results. Students will make regular class presentations throughout the term as their research proposal develops.

ERS 680 Sustainability Foundations

Review of theory, concepts, and examples of environmentally-sustainable development to help orient MES/ERS enquiry leading to the formulation of the individual thesis.

The elective courses:

The mandatory two elective courses must be taken at the graduate level. These two courses may be a course offered in another department or school in the Faculty of Environment or elsewhere in the university. The elective courses may serve to fill a gap in the student's background for the proposed research, or to provide more detailed understanding of a crucial area, or more generally to broaden the student's base of advanced understanding.

The milestone:

Students must complete their initial thesis/research agenda statement (1000-1500 words) outlining the topic, anticipated core questions, anticipated research approach, presented briefly in a collective meeting of the MES class.

Students will submit their statement to their advisor and the Graduate Program Advisor by email (Word document) by October 15th their first term of study. Presentations will be held approximately a week after the submission of the statement.

Additional courses

Students may choose to take additional courses, based on their own interest and discussion with their advisory committee.

Formatting your thesis

All theses must be formatted according to the University's Thesis Regulations. This document spells out requirements such as page layout, formatting rules and elements of the thesis. You should review this document carefully before you start writing your thesis.

THESIS AND THESIS DEFENSE

Presentation of a Thesis Paper (Department of Environment and Resource Studies)

1. Students may not submit a thesis paper for defence until all course work is complete and all other University and/or department degree requirements have been met.
2. Consult your Advisor about members of the examining committee, potential examiners, and a range of dates. The timeline described below is firm, so plan ahead. Your advisor will contact the Graduate Program Administrator to discuss the potential examination dates and members of the examining committee. All formal arrangements must be made through the Graduate coordinator.
3. The Graduate Program Administrator will look after booking a room but it is the student's responsibility to book any audio-visual equipment he or she require through MAD ext. 33416 or Audio-Visual Ext. 33341.
4. Candidates must present their thesis before their Committee and at least one reader who will serve as examiners for the oral examination. Rules for establishment of the MES examining Committee are available at the following link. Other interested members of the University community may attend the oral.
5. Normally, there will be no oral examination of a thesis until the student's committee is satisfied

that the thesis can go forward for examination by the committee. Should an impasse develop between a student and her/his committee on the matter of whether or not an examination should be scheduled, the student and/or advisor may seek advice from the Graduate Officer who will attempt to resolve the issue.

6. In evaluating the thesis at the oral presentation, committee members and readers will strive to reach a decision by consensus. Alternatively, the evaluation will be established by a simple majority of the ballot vote by committee members and readers. The decision of the examining committee (committee and readers) will fall into one of the following categories:

- Accepted
- Acceptable with Minor Modifications
- Accepted with Major Modifications
- Decision Deferred
- Rejected

7. Prior to the thesis oral examination, an abstract not exceeding 600 words will be prepared by the student and distributed to all Committee members. A copy of the thesis must be submitted electronically to the Graduate Program Administrator, at least two weeks (10 business days) before the oral examination along with copies to the following: Advisor, Committee Members, and Reader. Please check with your committee members to see if they prefer an electronic copy or a hard copy of the thesis.

8. For the oral examination the thesis must be complete including all maps, tables, and other illustrative materials.

9. Following the oral examination, any additions, or corrections to the thesis must be made to the satisfaction of designated members of the Committee.

10. When all additions and/or corrections have been made (normally within two weeks) the advisor must contact the Graduate Program Administrator by email indicating that the student has completed the requirements. A thesis acceptance form will be issued to the University Graduate Office. Once this has been submitted the student must submit the thesis electronically – please see Thesis Regulations at: http://www.grad.uwaterloo.ca/students/current/thesis_regulations.asp and <http://subjectguides.uwaterloo.ca/etheses>

Our faculty does not require bound copy.

NOTE: See Academic Deadlines for defending, electronic submission and to convocation at: <http://gradcalendar.uwaterloo.ca/?pageID=8940>

11. An Intent to Graduate Form must be submitted to the Graduate Administrator prior to defending, and after changes to thesis (if any) are approved by supervisor, it will be sent to GSO. Please notify the Graduate Administrator once you are submitting electronically so I can submit this form.

12. Please keep in mind that for Master's students, a minimum of 2 full weeks (10 business days) is required between the date the thesis is received by the committee/graduate coordinator and the date of the defense.

APPENDIX 3: PhD Program Overview for the Department of Environment and Resource Studies, University of Waterloo

The following information was taken from the ERS Website:

<http://uwaterloo.ca/environment-resource-studies/current-graduate-students>

PhD in Social and Ecological Sustainability Program Overview

The PhD program in ERS is devoted to understanding and pursuing sustainability in a dynamic and complex world, and to considering and integrating understanding across disciplines and scales from the organism to the planet.

Three broad conceptual themes guide the design and delivery of the [ERS PhD program](#):

- assessing the theoretical foundations and practical implications of progress towards sustainable societies, and application of this analysis as a broad context for specific work in particular situations;
- understanding socio-ecological interrelations as dynamic complex systems vulnerable to being over-stressed by human activities; and
- examining conventional and alternative social arrangements, including institutions and governance, as means of improving human wellbeing and environmental responsibility.

Within this general orientation, faculty and student research can be focused on quite specific topics but always with attention to the larger context of social and ecological systems and to the normative sustainability objectives within which the topics are embedded. Students pursue topics of particular interest to them, with guidance from faculty members and other people with appropriate experience.

Fields of Study

The program is transdisciplinary, integrating perspectives and insights from the natural and social sciences and the humanities. ERS does not divide itself into distinct specializations. Our teaching and research does, however, emphasize work in three overlapping fields:

- *Resource Analysis and Stewardship.* This field concerns an analysis of existing resource systems as well as creative and innovative ways of utilizing the earth's resources in a sustainable fashion.
- *Socio-Ecosystem Function and Renewal.* This field concerns ways to apply our knowledge of ecological systems towards renewing human relationships with the broader environment.
- *Sustainability Policy and Governance.* This field concerns existing and new forms of governance and policy with respect to sustaining healthy and resilient human communities and biophysical systems.

While the ERS PhD program helps to develop specialist understanding of particular considerations in the social and physical sciences within the three fields outlined above, the students will also be encouraged to think more deeply about why they are conducting specific research and how it fits in the broader realm of human life and decision making. Each of the fields includes a normative element that demands attention to purposes and underlying positions on how we ought to live on this planet.

Admissions

Successful [applicants](#) must hold a Master's degree with distinction (typically an overall average of at least A-), or the equivalent. We are interested in applicants from a broad array of fields and combinations of fields, including but not limited to the following: anthropology, biology, business, economics, communications, English, ecology, environmental studies, geography, planning, political science, engineering, sociology, and earth science. Beyond specialized training, most incoming students will have experience in a variety of fields of study and application. The program aims to provide the greatest possible flexibility for students to pursue a PhD that reflects both their previous training and their long-term intellectual vision.

Graduates

While our graduates will have specialized knowledge, they will leave here not chiefly as biologists, ecologists, sociologists, geographers or political scientists, but as scholars with access to a variety of intellectual and practical tools needed to address complex environmental issues and problems. This reflects the commitment of ERS faculty to the need for novel and advanced approaches to environmental research that mirror the transdisciplinary nature of environmental issues.

Community

ERS has a long tradition of open collegiality. Students are welcome to discuss their work and their experience of the program with faculty members in informal, as-needed meetings. They also have representation in monthly departmental meetings, and are invited to participate in all discussions about the department and its graduate program.

The department is devoted to being a supportive community for transdisciplinary excellence, helping students with a diversity of backgrounds to expand their individual capacities and collective strengths.

More Information

More detailed information on ERS and its faculty members is accessible at <http://www.env.uwaterloo.ca/ers>

For more information on the new doctoral program, contact [Jennifer Nicholson](#), Graduate Program Administrator or Bob Gibson, Associate Chair for Graduate Studies, ERS.

For more information on application requirements, see the University of Waterloo Graduate Studies website at <http://www.grad.uwaterloo.ca/>

DOCTORAL PROGRAM DEGREE REQUIREMENTS

Each student must

- complete a minimum of three one-term courses in the first year – the two core courses for students in the ERS PhD program (ERS 701 and ERS 702) plus one elective (a graduate course at the 600 level or above, selected in consultation with the advisor), with an overall average of at least 80%;
- prepare and defend a written [comprehensive examination](#) to assess knowledge within the chosen research area, explicitly situated in the broad transdisciplinary context of the PhD program and the chosen research area;
- prepare and defend a dissertation proposal;

- present a lecture on some aspect of their research and findings at a Faculty of Environment research seminar; and
- write and defend a [doctoral dissertation](#) based on original research.

The university has set the minimum required enrolment period for the Doctoral degree at six terms (two years) from completion of a Master's degree, and has set the maximum period for full time students as twelve terms (four years) from completion of the Master's degree, though time extensions may be granted.

For further information regarding university regulations see Minimum Requirements for the PhD Degree as set out in the Graduate Calendar (<http://gradcalendar.uwaterloo.ca/default.aspx?pageID=8943>).

The Advisor

Each student in the ERS doctoral program will have an advisor (or two co-advisors). Each advisor (or at least one advisor where there are co-advisors) must be accredited at the University of Waterloo as an Approved Doctoral Dissertation Supervisor (ADDS) and must be a regular or cross-appointed member of the Department of Environment and Resource Studies. Adjunct ERS faculty members may act as co-advisors.

The Courses

ERS doctoral students must take at least three courses, including the two core seminar courses (ERS 701 and ERS 702), and one elective, maintaining an overall average of at least 80 percent. The elective will be a graduate course chosen in consultation with the student's advisor.

The two core ERS PhD seminar courses

ERS 701 Sustainability in Socio-Ecological Systems

This course will examine transdisciplinary theoretical and methodological frameworks for analysing issues that arise from the complex interactions among human decision making, communities and biophysical systems at various scales.

The course will provide students with an understanding of how issues of social and ecological sustainability are approached by researchers from different academic fields and by practitioners facing a variety of related challenges. A core outcome will be basic literacy in the vocabulary of these different approaches to sustainability. Accordingly, the course will provide students with the tools to think broadly about sustainability beyond the confines of particular disciplines in which they may have prior training. The frameworks to be explored are applicable to broad environment and resource issues as well as to more specific topics that may include political ecology, environmental philosophy, environmental decision making, ecological economics, water governance, waste or energy policy analysis, ecotoxicology, restoration ecology, agroecosystem management, and food policy. Specific topics will normally reflect the interest of the doctoral students and the instructor. Guest speakers will provide additional applied examples of approaches to the study and pursuit of sustainability in socio-ecological systems. Students will be expected to deliver a paper and a seminar that critically assesses some theoretical/conceptual aspect or aspects of the literature in the field of social and ecological sustainability related to their research interests.

The course is designed to help students build their own broader contextual foundations for the more focused work of preparing for their comprehensive examination and developing a dissertation proposal.

ERS 702 Critical Analysis and Advanced Research in Environmental Studies

Building on the theoretical and conceptual foundations of ERS 701, this course examines the process leading from design of critical and rigorous transdisciplinary research to publication of findings and other outreach to the broader community. The course will include examination of doctoral research design in ERS, the nature of potential findings, and means of disseminating findings, including the diverse academic literature in environmental studies.

This course will explore research design challenges including the linking of broad ethical and analytical frameworks to a particular research agenda, the integration of conceptual and practical insights from diverse sources, and the application of complementary methodologies. It will also consider the many stakeholders in environmental research and audiences for research findings. Particular attention will be paid to assessing the peer-reviewed disciplinary and transdisciplinary literature in academic journals and monographs. The course will be enhanced by academic guest speakers, who will present their own research approaches and outreach experiences for class discussion.

The course is designed to help students prepare for their comprehensive examination and the first steps of their dissertation. Students will be expected to develop a first version of a research proposal, including consideration of the relevant audiences and potential outreach options.

The elective course

The mandatory third course is an elective, which must be taken at the graduate level. This third course may be a course offered in another department or school in the Faculty of Environment or elsewhere in the university. The elective course may serve to fill a gap in the student's background for the proposed research, or to provide more detailed understanding of a crucial area, or more generally to broaden the student's base of advanced understanding.

Additional courses

Students may choose to take additional courses, based on their own interests and discussions with their advisory committee. In some cases, students may be required to take an additional course or courses, for example to ensure they have the requisite methodological and other research skills in their field. They will also need to do so if they do not pass the comprehensive exam (see below).

Research and Doctoral Seminars

The Faculty of Environmental Studies has a joint faculty-graduate student research seminar series. ERS PhD students are required to deliver at least one lecture in this seminar series during their time in the program. They are also expected to attend the seminar lectures during their tenure in ERS, especially during their first year in the program. This series will help to establish a community of scholars and will also nurture their awareness of research in other areas.

Students are also encouraged to present research findings at a minimum of one academic conference and to submit at least one paper from the research to a refereed journal during their time in the program.

Ph.D. COMPREHENSIVE EXAMINATION

Department of Environment and Resource Studies, University of Waterloo

Candidates must complete a comprehensive exam within 16 months of beginning the program. Normally the exam will be held towards the end of the candidate's first year. The exam will be a diagnostic, with both oral and written components. The overall goal of the examination is twofold:

- To test the breadth and depth of the candidate's comprehension of leading literature and perspectives in his or her field of study
- To test the candidate's ability to situate that work in the broader contexts of transdisciplinary research and concerns related to the sustainability of socio-ecological systems.

The identification and delineation of the field of study will be accomplished through discussions between the candidate and his or her comprehensive examination committee. Because of the transdisciplinary nature of the work, the field may in many cases represent a conjunction of thought and practice in several areas and/or from several perspectives. In general, however, the comprehensive examination will address the literatures/practices most relevant to the program field of study (resource analysis and stewardship, socio-ecosystem function and renewal, sustainability policy and governance) of the anticipated thesis topic, leading to initial integration of the key relevant aspects of those literatures, considered in the broader context of social and ecological sustainability. Background preparation for this aspect of the comprehensive exam may include course work, previous training and/or independent or directed reading. These preparations will be guided through discussions with the major advisor and committee regarding areas of strength and weakness in the candidate's knowledge.

The procedure for the comprehensive examination will be initiated by the advisor who, in consultation with the Program Director, will identify appropriate members of the comprehensive examination committee. The comprehensive examination committee will be comprised of at least four members, including the advisor (or co-advisors), at least two regular ERS faculty members, and at least one examiner from outside the department. The Program Director, in consultation with the advisor, will be responsible for formally establishing the comprehensive examination committee.

The comprehensive examination question or questions will be proposed by the comprehensive examination committee for approval by the Program Director. The committee may choose to ask one core question, normally with subsidiary questions that specify matters for particular attention, or a set of linked questions, requiring some integration, but in all cases the question(s) must serve to require the substantive breadth described above. The written comprehensive response must be submitted within three weeks following receipt of the question(s) and must be no longer than 10,000 words, not including the bibliography. The candidate must defend the response in an oral defence open to the university community. The oral defence will normally take place within 10 days of submission of the written answers.

Students must complete the comprehensive exam before proceeding to the dissertation stage. Failure to take the comprehensive exam within the first 16 months may result in dismissal from the program.

Those who fail their exam may be permitted to re-take it once, if so recommended by the examining committee, but will first be required to take specified courses or to undertake other specified supplementary work to relieve weaknesses revealed by the first comprehensive. Candidates who are

permitted to re-take the comprehensive after completing additional requirements must satisfy the comprehensive requirement within one calendar year after the unsuccessful attempt. Candidates who fail to meet these conditions will be required to withdraw.

THE DOCTORAL DISSERTATION

Department of Environment and Resource Studies, University of Waterloo

The PhD program culminates in the writing and defence of a doctoral dissertation. The dissertation must draw upon transdisciplinary inquiry and original research.

Basic forms

Two forms of presentation are allowed:

- a standard dissertation monograph with a maximum of 70,000 words, addressing a particular purpose and set of questions, involving the building of an argument based on an integrated conceptual framework and original research; and
- a manuscript option, centred on three (or four) published or publishable learned journal-type manuscripts on related matters, packaged with introductory and concluding chapters that integrate the purposes/research agenda and findings/implications, with the required result forming a conceptual whole.

The particular requirements for the manuscript option in individual cases will be determined by the advisory committee. For example, depending on the nature of the core manuscripts, the committee may require inclusion of supplementary background or research material not in the manuscripts. In all cases, the following considerations apply:

- The manuscript-based dissertation must reflect a consistent overall conceptual foundation and research agenda and the parts must be integrated to form a coherent package. The whole must be related to the overall purposes of the ERS doctoral program, and the individual components of the dissertation must originate from the doctoral research.
- The manuscripts must be dominated by the intellectual effort of the student. While members of the advisory committee and others involved in the research may, as appropriate, be listed as secondary authors on individual manuscripts, the manuscripts must be written by the student, and the student must be the first author on each manuscript.
- Where multiple authorship occurs, there must be a preface statement in the thesis outlining the roles of the respective authors, and clarifying the extent and nature of the contribution of the student. Co-authors must sign the statement to indicate that they are in agreement with the evaluation of the roles and contributions of the various authors.
- In no case can a co-author serve as an external examiner for the thesis.

In consultation with the advisor and other members of the advisory committee, each doctoral student in ERS is expected to define his or her own area of focus and research agenda, and to situate

it in the larger context of social and ecological sustainability. This applies to all cases, recognizing that the thesis research may be a contributing part of a larger research undertaking, such as a funded research program under the direction of the student's advisor.

Each student's work in developing the dissertation proposal, conducting the research, and completing the dissertation will be done in close communication with the advisor and assisted by other members of his or her advisory committee. The advisory committee must be formed during the student's first year in the program.

Dissertation advisory committee

A dissertation advisory committee must have at least three members, including the advisor (or co-advisors) and at least one other faculty member with a regular, cross or adjunct appointment to ERS. The committee will be formed by the student, in consultation with the advisor. The Program Director, in consultation with the advisor, will be responsible for judging the appropriateness of the proposed committee and for seeking formal approval of the committee from the Associate Dean for Graduate Studies. The membership of the dissertation advisory committee may be very similar to the membership of the comprehensive examination committee, but this is not required.

Dissertation proposal and defence

Each student must prepare and defend a dissertation proposal following successful completion of the comprehensive examination, and no later than the end of his or her second year (sixth term) in the program. In exceptional cases an extension to allow defence of the proposal in the seventh term may be permitted. The proposal defence is a formal requirement of the program and, like the oral examination at the comprehensive stage, involves a presentation open to members of the university community.

The dissertation advisory committee is the examining committee for the proposal defence. Before approving the proposal in cases where the proposed dissertation research depends significantly on texts and/or interviews and/or other communication in a language other than English, the dissertation advisory committee must determine whether the candidate has sufficient proficiency in that language. If the candidate does not have sufficient proficiency in the view of the committee, the committee must prescribe suitable means for the candidate to achieve the necessary proficiency for the particular circumstances of the case. This may include requirements to take formal courses at the University and/or special training courses at the research location.

Upon formal approval of the proposal by the dissertation advisory committee, the candidate proceeds to the research and writing of the dissertation. Candidates who fail to satisfy the dissertation proposal presentation and defence requirement within the established time frame will be required to leave the program. In cases where the candidate's research agenda changes significantly following the proposal defence, the advisory committee will determine whether a revised proposal must be prepared and defended.

Dissertation defence

Normally, and in keeping with University of Waterloo regulations, students should complete and defend the dissertation within a maximum of 12 terms of full time study. This time limit can be extended only by following the procedures outlined in the University of Waterloo's Graduate Studies Calendar. Students are encouraged to complete the program more quickly.

Before the oral defence is scheduled, each student must have presented an element of his or her research at a faculty-graduate student research seminar (see above). Students are encouraged to

present their work when feedback will be most beneficial, for example, soon after completion of data collection.

When the dissertation is ready for defence – after having been reviewed by the advisory committee and revised as needed to address committee recommendations – the student will submit the dissertation formally and an oral defence will be scheduled.

The Doctoral Dissertation Examining Board will consist of all members of the dissertation advisory committee; an internal-external examiner (internal to the University but external to ERS) nominated by the advisor; and an arm's length external examiner (from outside the University of Waterloo) chosen by the Associate Dean for Graduate Studies, who shall be provided with a list of appropriate external examiners recommended by the thesis advisor and the Program Director. A Dissertation Examination Chair will be appointed by the Dean of Graduate Studies.

Details about the Dissertation defence requirements and decisions are available in the Graduate Studies Academic Calendar. See <http://gradcalendar.uwaterloo.ca/default.aspx?pageID=8943>

APPENDIX 4:

Etiquette – Requesting a Letter of Reference

By M.L. McAllister

The following Advisory for Requesting a Letter of Reference has been adopted by the Department of Environment and Resources Studies

When students graduate, they normally need a letter of reference from the professor. Professors are accustomed to writing these references and are very familiar with the accompanying forms. You do not need to ask for an appointment to request a letter of reference. An email request is fine. Here are the steps to follow.

1. **Make sure that you give the professor plenty of time to write a letter of reference.** This means a **minimum of two weeks** (after you give the professor all the relevant information and forms). Do not ask for one the same week that it is due. Profuse apologies do not compensate for the fact that the person writing the letter of reference will have to squeeze the request into a tight schedule, usually late at night. It is not at all uncommon for a professor in this department to write 50-100 letters of reference a year.
2. Send an email to the professor with an attachment of the job ad or the graduate program/scholarship that you are targeting. Ask the professor if s/he would be willing to provide a letter of reference. **Make sure that professor is either your supervisor or someone who knows you very well.** A reference will not be taken seriously if you are one student from a class of 100 and have only taken one class with that instructor. (Tip: It never hurts for students to ask if the person feels that she or he will be able to write them a good letter of reference. Sometimes, professors will write letters of evaluation and they might not always be positive.)
3. **If the professor agrees to write the letter, then send him or her ALL the necessary information and all the attachments in ONE email.** This is important. Given that many letters of reference

are written, the person writing the letter will not want to sort through multiple emails to get the requisite information needed for each reference for each student.

4. **Be organized. Make it easy to write the letter or reference.** In your e-mail, you should include
 - a. Your full contact information, address phone number, student number
 - b. The date by which the letter must be picked up by the student or mailed
 - c. The forms for the school (with all the personal data sections filled out) or alternatively include the information in the email request if the form does not allow you to include the data.
 - d. A c.v. or resumé
 - e. Information on the job/programme to which you are applying
 - f. A reminder to the professor about what courses you took with him or her and what you wrote about and **for each course, topics of essays or other major assignments you submitted and how well you did in each course.** Even if the professor knows you really well this extra information is helpful.
 - g. A statement of intention or the letter of application (this helps the professor write an informed letter or reference and will hold more weight)
 - h. An electronic copy of your informal transcript.
-

APPENDIX 5: Etiquette – E-mail

By M.L. McAllister

The Department of Environment and Resource Studies has adopted the following Advisory for Handling All University-related E-mail

In today's society, we are confronted by a flood of e-mails. Although it is a useful tool, it also can undermine a sustainable and productive work environment. On top of our regular responsibilities with respect to teaching, research, administration and outreach, faculty and staff receive dozens of e-mails a day -- many of them with long attachments. Please observe the following:

1. Please do not expect a response from a staff, faculty member or tutor outside of regular business day hours. In other words, even though it takes a minute to send an e-mail, your message is only one of many that we have to read so you might not get a response until the following week. **SO PLAN AHEAD!** Avoid last minute requests.
2. If you have not had a response within a week, it is reasonable to send a follow up e-mail to the staff or faculty member to ensure that the message was received. If you still do not receive a response, go to the office hours.
3. If you are a student and you send an e-mail to someone in the department, please first read the e-mail etiquette note below. If you want to receive a favourable response, you might want to think about what kind of message you are sending.
4. Only use your University of Waterloo e-mail address when communicating with staff and faculty. E-mails from other accounts may be viewed as spam and filtered out.
5. Make sure that you also have a subject heading. Again, e-mails without a subject are often viewed as spam.

E-mail Etiquette for Students:

Remember to use different communications approaches for different audiences:

The following approach when writing to a friend is probably quite acceptable to your audience:
hi karen, did u get your assignment back yet for ers i cant believe i only got a 59 after i spent 24/7 working on the stupid thing!!! i cant go out with u guys thursday b/c i have to study for that exam on friday especially after that assignment. if i don't pull my mark up, i'll get put on probation, and my parents will be ticked off. NEways, i'll ttyl, L&R, sharon

It does not go over very well, however, if you use the same format when addressing someone that you do not know as well:

dr wallas: i need to know why i did so badly on that last assignment. i don't get why i only got a 59. i worked really hard on that assignment, and i dont think its fare. i looked at my friends paper, and she put practicly the same thing and got a 76 why? i always get better marks then her. i cant come during your office hours and you are never around when i drop by so we need to arrange a time to discuss this. Sharon

The following approach will be more effective:

Dear Professor Wallis* <In ERS, you can address professors by their first name>

I am very concerned about my mark in your (_____) class. I did not do well on my last assignment and do not know where I went wrong. I would appreciate it if you could take some time to go over it with me. I would like to improve my mark in the course. Unfortunately, I have another class during your office hours. Please let me know if there is a convenient time that I could meet with you to discuss the assignment.

Thank you for your time.

Sincerely,

Sharon Simpson

*If the professor has specified that it is customary in the department to use first names, feel free to do so. If you are addressing someone in the professional world, use Mr. or Ms. (Not Mrs.) It is not customary to call professors Mr. or Ms. (or Mrs.). Usually, it is Professor or Dr.

When addressing anyone you do not know personally, it is always safer to address them by the last name even if you are feeling friendly. Some people in the working world do not take kindly to over-familiarity particularly if you are asking them for a favour (e.g. you wish to interview them).

If you are a tutor, remember that you are also a teacher. This means that you should also take care with grammar, punctuation and spelling when communicating with your students or the professor. You cannot go wrong with a formal writing style but sloppy communications can make a bad impression because it demonstrates that you cannot be bothered to write carefully. It also suggests that you do not know how to communicate effectively.

Other e-mail advice:

- Do not send anything in an e-mail to anyone that you would not want published on the front page of a newspaper.
- Avoid "reply all" unless it is really necessary that everyone sees your reply for their information or action.

- Edit replies to remove extraneous material, such copies of copies of copies of copies of previous back-and-forth e-mails unless that information is useful to the reader or one long record of the interaction is helpful.
- DO NOT USE CAPITAL LETTERS WHEN ADDRESSING SOMEONE. THAT IS CONSIDERED YELLING.
- When you send a file attachment to a professor, it is also helpful to put your last name in the file name, e.g. Simpsonchapter1. Think about how many Chapter 1 files that a professor might be sent at any one time.
- Be careful when sending out humorous jokes on distribution lists. Your sense of humour is not necessarily appreciated.
- Only use the "high priority" icon when you truly have a high priority.
- Make sure that your distribution lists are tailored to your audience.
- Be very careful about automatically copying e-mails from someone else to a general list of people. Each communication that you receive from someone else should be treated as confidential and not forwarded on unless there is a good reason to do so (preferably with the original sender's permission).
- Make sure that you carefully proofread your e-mails before you send them. Spelling and grammar influence the reader particularly when you are sending an e-mail to someone who is evaluating you with respect to assignments or a work placement.
- If you are angry or feeling impatient, send the e-mail response the next morning. Be careful about using that "reply" icon too quickly.
- Think carefully about what name you choose for your user ID. What you might find humorous, potential employers or staff may think that it reflects questionable judgment.

APPENDIX 6: Etiquette – The Professor’s Office Door

At times, the office door of a professor, or your advisor may be open, ajar, or closed. These typically mean the following:

1) Door Wide Open: The person is able to chat with the student on a drop in basis.

2) Door Ajar: The person is busy (on the telephone, in a meeting or engaged in other activities (writing a paper, proposal, preparing for lecture). It is not advisable to disturb the professor unless absolutely necessary or if you have an appointment set for a specific time.

3) Door is Closed: Do not disturb ! A closed office door means do not knock or disturb the person inside the office in any way unless you have an appointment set for a specific time.

For further information see the following links:

<http://chronicle.com/article/A-Scientists-Guide-to/49080/>
