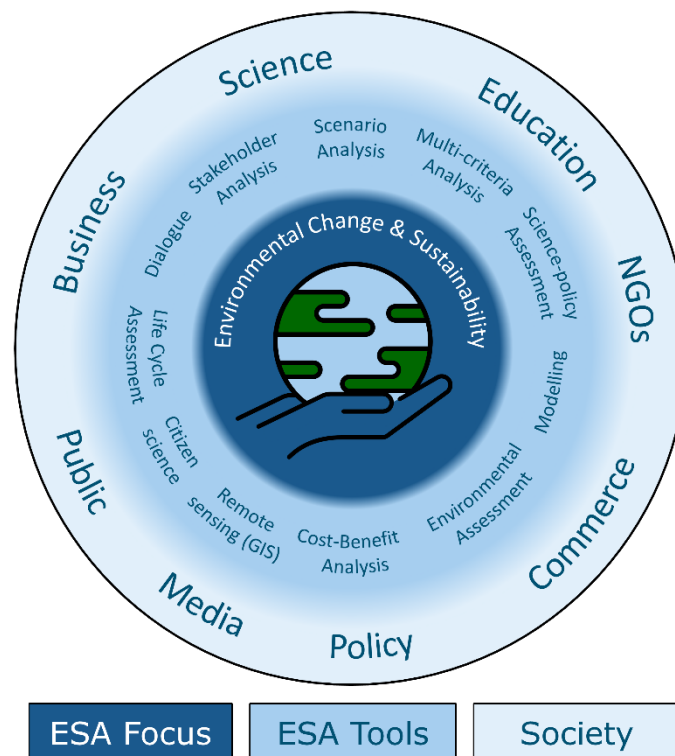![Wageningen University & Research logo]

MSc Thesis Course Guide Wageningen University

- Part A: General thesis information Wageningen University (WU)
- Part B: Specific thesis information Environmental Systems Analysis (ESA)

Part A: August 2024 (V7.1)
Part B : September 2024

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Part A: General thesis information
Wageningen University

1   General information

This course guide describes the procedures for the MSc thesis supervision and writing process for all chair groups of Wageningen University. This course guide applies to both compulsory and extra theses. It is meant for staff and students. It includes information about the goal of the thesis, the necessary procedures before starting and during the thesis, as well as the assessment procedure.

A separate course guide applies to the *Research Practice*. This is a thesis-like project with additional learning outcomes and related assessment criteria that – depending on the programme and individual arrangements made with the Examining Board – may be done instead of an internship.

1.1   Course profile

The MSc thesis enables the student to put their acquired knowledge and skills into practice by individually and independently conducting a research project within the scope of their programme.

Language: English
Credits: 30 - 39 EC (compulsory theses) or 24 - 33 EC (extra theses)[1]
Period: The start date of your thesis is determined in consultation with your thesis supervisor

Most study programmes require a minimum of 36 credits for the compulsory thesis; see the Study Handbook for more information. As a guideline, a full-time thesis of 36 credits (EC) equals 24 weeks of 42 hours/week or 26 weeks of 40 hours/ week). Only in consultation with the thesis coordinator (of the chair group) and your study adviser, can you extend the length of your (compulsory) thesis to a maximum of 39 credits.

Specific requirements (e.g. mandatory knowledge) for each MSc thesis can be found in the online Study Handbook. Please check with your study adviser for any programme specific requirements. Finally, you should be officially registered as a Wageningen University MSc student.

1.2   Learning outcomes

After the successful completion of your MSc thesis, you are expected to be able to *independently* carry out the following aspects of a research project:
1. Develop a research plan, including: a description of the research topic in relation to the wider scientific context; an identification of the knowledge gap; formulation of research questions and/or a hypothesis, aims and objectives; an explanation of how you intend to conduct the research (e.g. in terms of a design for the project, data-collection and -analysis methods, research tools).
2. Collect, select and process data, using the design for the project, methods and tools described in the research plan.
3. Analyse and synthesise the data in order to answer the research questions and/or test the hypothesis.
4. Formulate answers to the research questions that are supported by the research outcomes; pay

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[1] You may choose to include an extra thesis as part of the electives in your study programme. The extra thesis has a minimum size of 24 EC: 16 weeks of 42 hours/week or 17 weeks of 40 hours/week. This extra thesis *cannot* replace an internship of research practice.

attention to potential limitations; critically discuss the outcomes in relation to the wider scientific and societal context.

5. Report on the research, both in writing and in oral presentation.
6. Work in compliance with academic codes of conduct and with proper management of time and resources.
7. Make use of input and feedback for executing the research project and provide feedback to others.

2   Preparation of your thesis

The supervision of your thesis is the responsibility of a Wageningen University chair group. Your study programme determines which chair groups are entitled to supervise your thesis project. Consult the description of your MSc programme in the Study Handbook and contact your study adviser to find out more about the chair group(s) allowed to supervise your thesis. If you find a thesis topic that does not meet these criteria, but which, in your opinion, is extremely relevant for your programme, you should contact your study adviser and ask for approval from the Examining Board.

2.1   People involved in your thesis

Actors involved in the learning process:
- The *thesis coordinator* is the contact person within the chair group. You can find the thesis coordinator of each chair group in the online Study Handbook of Wageningen University (as the coordinator of the thesis course code). The student enters in Osiris who is their main and administrative supervisor.
- The *main and administrative supervisor* is responsible for guiding the thesis project. They are an employee of your chair group. They are often an academic WUR staff member[2], but they can also be an experienced PhD candidate or a post-doc. PhD candidates and post-docs will preferably have taken the courses 'Start to Supervise BSc & MSc thesis students' and 'Supervising BSc & MSc students' from the Education Support Centre, potentially as part of their Training and Supervision Plan. A technician may also be involved.
- A *second supervisor*. If the daily supervisor is a PhD candidate, the second supervisor of the MSc student is usually the supervisor of that PhD candidate. There can also be content-related reasons to appoint a second or third supervisor or advisor.
- *Advisor*(s): other people not involved in supervision.

Actors in the assessment (the main and administrative supervisor assigns the assessors and examiner in Osiris):
- *Assessor 1* is responsible for evaluating the thesis project. This is an academic WU staff member[2]. They are preferably involved in supervision as they assess the student's performance. Hence, assessor 1 will often be the daily supervisor (provided that they match the definition of academic WU staff member).
- *Assessor 2* is responsible for an independent assessment of parts of the thesis project (at least the report). Assessor 2 is often the examiner, but not necessarily. This role has the same requirements as Assessor 1.
- *Examiner* (one of the two assessors[3]), who is responsible for evaluating the thesis project and coordinating grades throughout the chair group. They are appointed by the Examining Board, and

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[2] From the EER for the academic year 2023/2024 onwards, the following holds for both supervisors and assessors: 'During the internship, thesis and research practice, the Master's student is supervised by a WUR staff member affiliated with a chair group with a PhD degree or an equivalent research profile, or someone who performs this role under the responsibility of this staff member. The equivalence of the research profile is at the discretion of the examiner of the course under consideration.'.

[3] In previous versions of the course guide, it was stated that the examiner is 'often Assessor 2'. However, the EER states that the 'the examiner is one of the assessors' (article 46b in EER 2023/2024).

they are listed as examiner in the Study Handbook under the MSc thesis course code. Requirements: a PhD degree or other demonstrable experience with the MSc thesis subject[4]. Only examiners listed for the courses in the course catalogue can decide and finalize the grade in Osiris.

2.2   How to find a thesis (topic)

There are differences between chair groups with regard to how theses should be found and arranged. In general, you can take the following steps:
- Attend a thesis information meeting, organised by your MSc programme or the chair group. In a few programmes, you need to participate in a thesis allocation procedure.
- Contact your study adviser to discuss the options for thesis subjects.
- Visit the Wageningen University websites of chair groups that are entitled to supervise an MSc thesis within (the specialisation of) your study programme.
- Find thesis subjects via the thesis database at WU-website (currently this is the TIP database: tip.wur.nl; an alternative is under construction).
- Make an appointment with the thesis coordinator of the chair group and discuss which thesis subject(s) you are interested in. Names of thesis coordinators can be found in the online Study Handbook.

The thesis subject should preferably match the overall research field of your programme. You must discuss both the topic and timing with your study adviser and the thesis coordinator of the chair group in a timely manner, especially if your thesis includes an experiment or field work abroad: this can sometimes take several months to arrange.

2.3   Learning Agreement

Before the thesis starts, you and your supervisor have to discuss and agree on the content and overall planning of your thesis. After this, you can initiate the Osiris administrative process. You can find the instruction on how to initiate the process at https://wur.eu/tir-start.

Subsequently, you and your supervisor have to make more detailed agreements related to your learning process during the thesis. These agreements are written down in the Learning Agreement. To have an overview of the various topics covered in the learning agreement you can consult the checklist learning agreement. You as a student fill in the learning agreement in Osiris. An overview of the entire process in Osiris is available in the form of a presentation with screenshots.

One of the aspects addressed in the learning agreement on OSIRIS is intellectual property rights. The text of the statement you have to sign can be found in Appendix III: Intellectual property statement for student. Related to that, discuss potential confidentiality issues with your supervisor. In principle, your MSc thesis is not considered confidential, however, if part of your results is used in a larger research project, contract research or research that is subject to patenting, then confidentiality agreements may apply. You should be informed by the thesis supervisor prior to starting if your thesis is part of a contract research programme or a patent procedure.

Discuss transfer of results and data with your supervisor as well. Do not only specify *that* the data are

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[4] Rules and Regulations of the Examining Boards, Article 8

transferred but also *when* (during and/or after the project, before or after the final assessment) and *how*. To simplify the work of the supervisor, it is good practice that the student is informed about the relevant data management protocol (of the chair group and/or the research project), so that the student can prepare the data in an appropriate way (check with the data steward of your chair group). If the chair group uses a specific format for a data management plan, this is included in the chair group specific regulations in this course guide (Part B).

2.4 Information on WU travel policy, insurance and grants

The MSc-thesis is a research project under the responsibility of a WU chair group. However, it is possible that part of the work (e.g. data collection) will take place outside WU, and possible outside the Netherlands.

2.4.1 Travel policy for students

Are you planning to travel abroad or, as an international student, are you temporarily travelling back home in the context of your studies at Wageningen University & Research? Find out in good time whether this trip concerns a **risky area** (source: Dutch Ministry of Foreign Affairs). If so, you will have to receive permission. If this is relevant to you, you should submit a **travel request** together with your thesis coordinator.

You will need to complete a form that also functions as a checklist to ensure that you are well-prepared for your trip. This checklist includes precautions to be taken – both mandatory and otherwise – such as travelling together with a student who is already familiar with the area, (additional WU) insurance, safety training, registration in Kompas (Foreign Affairs), and recommended vaccinations. You can find the form on the website mentioned below.
For actual information on travel policy WU, check the website:
https://www.wur.nl/en/Education-Programmes/Current-Students/Travel-policy-for-students.htm

2.4.2 Travel Insurance

Students participating in internships and/or conducting thesis work abroad as part of their study programme at the University are covered by the collective travel insurance of Wageningen University & Research. You do not need to pay to make use of this collective travel insurance. More information you can find here (heading Collective Travel Insurance):
https://www.wur.nl/en/Education-Programmes/Current-Students/Insurance.htm

2.4.3 Grants

There are some possibilities to apply for grants if your thesis, internship or research practice takes place in a foreign country, but most times the chance to receive a grant is small. For information about grants, see the following websites:
- https://www.wur.nl/en/Education-Programmes/Study-Abroad-and-Exchange-Students/Outgoing-from-Wageningen-University.htm
- http://www.beursopener.nl/content/index.asp (unfortunately in Dutch only)
- https://www.wur.nl/en/Education-Programmes/master/Study-grants.htm
- https://www.wur.nl/en/Education-Programmes/Current-Students/Travel-Funding.htm

3 Points of attention during the thesis

3.1 Well-being

Your MSc-thesis may be challenging for you in many ways. You may need to stretch yourself to master the contents, your academic or general skills may put to the test. Furthermore, the required level of independence may be a new experience for you, and you collaboration skills may be tested in the intensive collaboration within a small team (your supervisor and possible some other people involved in your research).

Given these challenges, it is of utmost importance to monitor your well-being. Make it a topic that you discuss with your supervisor with some regularity, but also with your fellow thesis students. If you feel that you need to discuss things that go beyond what you would like to discuss with your supervisor, do not hesitate to contact your study advisor.

Useful links about student guidance and social safety can be found in Appendix IV: Information on student guidance and social safety.

3.2 Supervision

Each chair group organises the appointment of supervisors differently. Contact the thesis coordinator of the respective chair group to check their specific procedure.

The first (main) supervisor is always a staff member of the responsible chair group, but sometimes, a second or even a third chair group may be involved in the supervision of an MSc thesis. In general, students are entitled to have regular meetings (e.g. every two or three weeks) with the primary supervisor. The actual frequency of meetings may vary depending on the nature of the thesis project. In order to make the meetings effective, the student needs to prepare for them, for example by preparing documents for the meeting (e.g. a chapter of the thesis or a list of discussion points) and by sending the document to the supervisor well in advance of the meeting. The supervisor, in turn, is expected to read the documents sent to them and to discuss them with the student during the meeting. As the thesis project is a learning experience, students are encouraged to act independently when resolving problems or in difficult situations. However, in cases of urgency, the supervisor should be available for feedback and support in between the regular meetings. Agreements on how to deal in such situations should be included in the Learning Agreement.

3.3 Ethical behaviour and plagiarism

Attention to scientific integrity is an important aspect of your academic education, including the various aspects that are relevant for an academic researcher. You always have to be aware of the fact that you could get into an ethical dilemma and you should be prepared if you run into such a situation. We refer to the Netherlands Code of Conduct for Research Integrity (see Appendix I: Netherlands Code of Conduct for Research Integrity).

The main principles described in this code concern:
- **Honesty** means, among other things, reporting the research process accurately, taking alternative opinions and counterarguments seriously, being open about margins of uncertainty, refraining from making unfounded claims, refraining from fabricating or falsifying data or sources and refraining from presenting results more favourably or unfavourably than they actually are.
- **Scrupulousness** means, among other things, using methods that are scientific or scholarly and exercising the best possible care in designing, undertaking, reporting and disseminating research.

- **Transparency** means, among other things, ensuring that it is clear to others what data the research was based on, how the data were obtained, what and how results were achieved and what role was played by external stakeholders. If parts of the research or data are not to be made public, the researcher must provide a good account of why this is not possible. It must be evident, at least to peers, how the research was conducted and what the various phases of the research process were. At the very least, this means that the line of reasoning must be clear and that the steps in the research process must be verifiable.
- **Independence** means, among other things, not allowing the choice of method, the assessment of data, the weight attributed to alternative statements or the assessment of others' research or research proposals to be guided by non-scientific or non-scholarly considerations (e.g., those of a commercial or political nature). In this sense, independence also includes impartiality. Independence is required at all times in the design, conduct and reporting of research, although not necessarily in the choice of research topic and research question.
- **Responsibility** means, among other things, acknowledging the fact that a researcher does not operate in isolation and hence taking into consideration – within reasonable limits – the legitimate interests of human and animal test subjects, as well as those of commissioning parties, funding bodies and the environment. Responsibility also means conducting research that is scientifically and/or societally relevant.

Appendix I: Netherlands Code of Conduct for Research Integrity provides a summary.

You are expected to be familiar with proper citing and referencing techniques before you start writing the thesis and are advised to consult relevant information available on the WUR-website (e.g. 'Citing and referencing'). Improper citing and referencing may be considered as plagiarism, which is a form of fraud. Staff are expected to screen all writings carefully for similarity with known sources; the University has made software available for this purpose. In case of suspicion of plagiarism, either of text, figures, models or data, the Examining Board will be informed. In the Rules and regulations of the Examining Board, procedures and sanctions regarding fraud are described.

3.4   Use of generative artificial intelligence (e.g. ChatGPT, BARD, DALL-E, Elicit)

The use of generative artificial intelligence to create ready-made content in assignments is considered fraud, so it is not allowed to copy-and-paste the output of AI.

However, you are allowed to use AI as a sparring partner, and as a feedback tool for the quality of your text (e.g. as a spell checker or grammar checker). However, the use of AI is always subject to the following rules:

- Acquiring active writing, designing and reflection skills is an important part of your thesis. The use of AI should only be in support of, not as a replacement for these skills.
- You will always be held accountable for the correctness, completeness, and coherence of all your texts. The correctness of the output of AI is never guaranteed. AI chatbots have been known to confidently assert false claims as true. You should always critically evaluate the output.
- When you use AI for your work, acknowledge your use and report how it affects your products.

Your thesis report should contain an **appendix on the use of AI**. In this appendix, you state whether you used AI for your research and report, and if so, how. In case you did not use AI, this appendix can be one sentence in which you state that you did not use AI. In all the other cases you have acknowledge your use and report how it affects your assignment. The appendix should contain a list of the prompts you used, a link to the conversation (see FAQ for ChatGPT) and an explanation of how you used the output

of AI (i.e. in what way did the output of AI affect your text).

3.5   Progress evaluation

The progress of the thesis project should be evaluated according to the schedule in the learning agreement, ultimately before one third of the duration of the thesis project. The principle of two-way feedback applies. The progress evaluation is a moment of reflection to determine which aspects of thesis process are going well, which aspects the student needs to improve on and how supervision should facilitate this.

It is strongly advised to use the applicable criteria in the rubric (available here) to evaluate the student's performance. These cover all aspects of the thesis project at that point (i.e. performance, research proposal) and supervision. Your supervisor may ask you to assess your own level of performance. Additional aspects in the progress evaluation may be your participation in seminars and thesis rings, data management, record keeping, etc. Your supervisor may also ask you to orally present your research plan to colleagues and peer students, which also serves to help you practice presentations. Generally, the conclusion of the progress evaluation will be that you continue with your thesis project, potentially with some adaptations in planning, content, supervision and/or improvements in your knowledge, skills or attitudes.

If your supervisor considers that your progress is such that successful completion of the project is unlikely, you should be given the opportunity to improve. Your supervisor should clearly indicate what improvements are required and within which timeframe. If the lack of progress is the result of a mismatch between your supervisor and your, a switch of supervisor should be considered.

If, after the set timeframe for approvement(s), your supervisor considers your progress as being still not enough to successfully complete your thesis, the supervisor should involve an examiner (four-eyes principle). Together, they could consider termination of the project with a 'no-go' decision. A no-go decision must be taken by the examiner. It must be well explained to you, and the explanation should be recorded in Osiris. The supervisor should ensure that this 'no-go' decisions is taken before half way the nominal duration of the thesis project, to prevent further delay for the student. Your supervisor must inform the study advisor to create a safety net for the student outside the chair group and facilitate a 'warm handover'. Note that the student may disagree with the no-go decision and submit an appeal to Examination Appeals Board (CBE)[5].

Depending on the reason for the no-go decision, there may still be a role for the chair group in the follow-up. In consultation with the study advisor, the supervisor and the examiner, the student may, for example, be recommended to take additional education first (e.g. courses on content or skills, like academic writing). The student can also be assigned a topic that fits their knowledge and skills better. These adjustments require them to restart their thesis.

3.6   Meetings (lab meetings, colloquia, seminars)

During your thesis period, you may participate in work discussions and other meetings of the chair group. Many chair groups have weekly work discussions in which research progress of all group members is discussed. Depending on the chair group, you may be asked to join the discussion group

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[5] Rules and Regulations of the Examining Boards, Article 28.2

that is related to your research topic. Ask your supervisor when your chair group holds discussion sessions.

Both students and staff present their results to the other members of the chair group during colloquia. In general, students have to attend these colloquia.
Some chair groups organise literature discussions on papers that are relevant to their field, or organise seminars, during which guest researchers present their research or designs.

4 Thesis activities

This section describes the different stages of the thesis project in general terms. See Part B of the course guide for the specific requirements of your chair group.

4.1 Research proposal/planning

At the start of the thesis, you will discuss the topic with your supervisor and read literature related to the project. After this initial orientation, you write a research proposal, which has to be discussed in depth with your supervisor(s). The research proposal should include a problem statement, research questions or a hypothesis that is supported by up-to-date literature related to the topic, an explicit and specific plan regarding how the research is to be conducted (e.g. study design, data collection and analysis methods) and a time schedule.

If drafted correctly, sections of the proposal can be used to write the final thesis report (e.g. the Introduction and Methodology sections). However, you cannot start conducting the research project before the research proposal has been approved by your supervisor(s).

When your proposal is completed, you may be asked to present your research proposal to other students and staff members in order to acquire feedback and suggestions for improvement. Discuss format and content for your presentation with your supervisor. The presentation should be given in English in order to allow international students and staff members to participate in the discussion.

In the planning part of your proposal, also pay attention to data management: e.g. safe storage / sharing / transfer of data (during and after the thesis), (personal) sensitive data, ownership (especially when data is provided by others), organising folders and files, file naming, etc. (see also the relevant part of the Learning Agreement, section 2.3).

4.2 Carrying out the research project

You should document your research activities, findings and sources carefully, including seemingly small details. During data collection, analysis and synthesis, you should follow the agreements made in the data management plan. In experimental research, a lab or field journal has to be kept.
You are recommended to keep in close contact with your supervisor throughout the project. Should unforeseeable circumstances occur, you will have to adapt your research proposal; any changes in planning must be discussed with and approved by your supervisor.

4.3 Feedback

Dealing with feedback and providing feedback to others is one of the learning outcomes of the thesis. While carrying out your project and attending meetings, there will be ample opportunities for you to ask for and receive feedback from staff and students, and to give feedback to others as well. The chair group will request that you participate in thesis rings or other peer-learning sessions. Using this input will help you to further develop your knowledge, skills and attitude and make the best of your project.

4.4 Thesis report

Your research should result in a comprehensive, consistent and concise thesis report. It is important to realise that the thesis is not a chronological account of the project or a summary of the lab-journal. Furthermore, as good scientific writing dictates, the results should be properly organised and data should be correctly processed, analysed and presented. In principle, an MSc thesis report should contain all the elements of a full scientific paper in your discipline (see Part B for specific criteria for your chair

group).

In some cases, it may be possible to write your thesis in the format of a scientific article, which is usually much shorter than a regular thesis report. Discuss this with your supervisor. Publication of the results of your research in proceedings or a scientific article is also possible. The supervisor of the chair group will generally be co-author of any publications originating from thesis work. In case of publication of the work of an MSc-thesis, proper publication of the data in a open repository may be required.

You usually get one possibility to discuss a draft report with your WU supervisor before handing in the final report. In many chair groups it is common practice to discuss chapters separately in the final stage of the project.

4.5   Oral presentation (colloquium)

Once your research has been completed, you are required to present your thesis and your major findings to other students and staff members of the chair group. Chair groups usually have a fixed schedule for these presentations. Appointments for a date, and the publication of the announcement should be made well in advance. You may discuss the structure and content of your presentation with your supervisor in advance so they can offer feedback and advice. The presentation must be in English so international staff and students can participate in the discussion.

4.6   Oral defence

The final oral defence is a discussion with your supervisor, the examiner and, in some cases, a supervisor from outside the chair group not involved in the grading of the thesis. The discussion focuses on the content of the thesis, in which your knowledge, understanding, insights, as well as creativity and scientific attitude are evaluated. You are expected to be able to place your results and conclusions in the wider context of the field of science. The oral defence will be scheduled ten working days after you have submitted your reports to the supervisor and examiner. You must make an appointment for the oral defence.

5   Completion of your thesis

5.1   Assessment of the thesis

For the Wageningen University assessment, supervisors/examiners use the Wageningen University Thesis Assessment Form (see Appendix II: Assessment form, rubric and learning agreement). The average grade for each category (performance, thesis project report, oral presentation (colloquium), oral defence) should be at least 5.5 for a pass.

The assessment strategy below shows the relation between the learning outcomes and the different parts of the assessment.

Weights	Description	Performance	Research Report	Oral presentation	Oral defence
	% of grade	40%	50%	5%	5%
Learning outcomes	1 Develop a research plan, including: a description of the research topic in relation to the wider scientific context; an identification of the knowledge gap; formulation of research questions and/or a hypothesis, aims and objectives; an explanation of how you intend to conduct the research (e.g. in terms of a design for the project, data-collection and -analysis methods, research tools).	x	x		x
	2 Collect, select and process data, using the design for the project, methods and tools described in the research plan.	x	x		x
	3 Analyse and synthesise the data in order to answer the research questions and/or test the hypothesis.	x	x	x	x
	4 Formulate answers to the research questions that are supported by the research outcomes; pay attention to potential limitations; critically discuss the outcomes in relation to the wider scientific and societal context.	x	x	x	x
	5 Report on the research, both in writing and in oral presentation.	x	x	x	
	6 Work in compliance with academic codes of conduct, and with proper management of time and resources.	x	x		
	7 Make use of input and feedback for executing the research project and provide feedback to others.	x			
Assessors	Assessor 1	x	x	x	
	Assessor 2	optional	x	optional	
	WU Examiner (grade)*	x	x	x	x

* The examiner will determine the final grading after a discussion with the supervisor/second assessor.

A [rubric](#) is used for feedback and grading (see also Appendix II: Assessment form, rubric and learning agreement). Both assessors independently assess one or more aspects of your thesis work. Subsequently, the examiner, usually in consultation with both assessors will determine the final grade for the different criteria. Apart from that, you will generally have a final meeting in which your supervisor and/or examiner will provide you feedback on the overall project (beyond just the assessment). In some groups, the oral defence and the final meeting may be combined in a single meeting.

The assessment, the final grade, as well as an underpinning of the grade will be registerered in OSIRIS. After the examination, you will receive the reasoning behind your thesis grade, including specific feedback on all assessment categories.

5.2   Delay and possibility to resit

The start and end date of your thesis are recorded in the Learning Agreement. You should complete the thesis project within the time allocated to this programme component (i.e. 6 months for a 36 EC thesis or 6.5 months for a 39 EC thesis). Ensure that the research proposal is realistic and contains a contingency plan ('plan B').

Below we discuss the three acceptable reasons for a longer runtime of a thesis project. There are a three acceptable reasons for a longer runtime of an thesis project: planned longer duration of your thesis project, force majeure or an insufficient result for your thesis. Other causes for delay are *not* acceptable.

5.2.1   Planned longer duration of the thesis project

If the student plans to undertake additional activities next to the thesis, the total runtime of a thesis project can be longer than the nominally allocated time. Examples are you have a job, have planned holidays, or will do a student-assistantship. You can take this into account when registering the expected date of completion (to be filled out in the learning agreement). This situation is *not* considered as delay.

5.2.2   Delay due to force majeure

If the planned period needs to be extended due to *force majeure*, you should submit a request to the student dean. The dean is to decide whether this is a case of *force majeure*, and advises the Examining Board. The Examining Board can then decide to extend the term for the thesis. In that case, the expected date of completion will be moved forward, in accordance with the extent of the delay.

5.2.3   Delay due to an insufficient result

Around the expected date of completion of the thesis, the thesis is assessed, and the grade is registered in Osiris. In this way all students are graded after the same amount of time, which makes the grading fair for all students.

If the assessment is insufficient, but your supervisor and you expect that you will be able to finish the project successfully within two extra months, the examiner registers the grade in Osiris as INCOMPL. Next, you have two months to improve the work to a sufficient level. In the case of *force majeure,* these two months can be extended under the same conditions as above (via student dean and Examining Board).

After two months, the work of the student's work is assessed again (again with two independent assessors, and the examiner determining the final grade). If the result is sufficient, the grade is registered in Osiris. If the result is insufficient, INSUFF will be recorded in Osiris.

In case of an insufficient final grade, you can start a new MSc-thesis, not necessarily with the same supervisor or in the same chair group. This is officially considered a resit but means that the entire thesis needs to be redone.

5.3   Course evaluation for your thesis

Following the assessment, Wageningen University will send you a link to an online evaluation questionnaire. Please complete this, even if your thesis project is finished. The results of the questionnaires help us to improve the quality of the thesis supervision and organisation, and to identify potential (or actual) problems. The evaluation is anonymous.

6 Appendices

6.1 Appendix I: Netherlands Code of Conduct for Research Integrity

Students and staff at Wageningen University Research are bound to the Netherlands Code of Conduct for Research Integrity (it is part of the Student Charter).

6.1.1 Principles

The main principles described in this code concern: Honesty, Scrupulousness, Transparency, Independence, Responsibility.

Chapter 2 of the Code of Conduct summarizes the principles as follows:

Honesty means, among other things, reporting the research process accurately, taking alternative opinions and counterarguments seriously, being open about margins of uncertainty, refraining from making unfounded claims, refraining from fabricating or falsifying data or sources and refraining from presenting results more favourably or unfavourably than they actually are.

Scrupulousness means, among other things, using methods that are scientific or scholarly and exercising the best possible care in designing, undertaking, reporting and disseminating research.

Transparency means, among other things, ensuring that it is clear to others what data the research was based on, how the data were obtained, what and how results were achieved and what role was played by external stakeholders. If parts of the research or data are not to be made public, the researcher must provide a good account of why this is not possible. It must be evident, at least to peers, how the research was conducted and what the various phases of the research process were. At the very least, this means that the line of reasoning must be clear and that the steps in the research process must be verifiable.

Independence means, among other things, not allowing the choice of method, the assessment of data, the weight attributed to alternative statements or the assessment of others' research or research proposals to be guided by non-scientific or non-scholarly considerations (e.g., those of a commercial or political nature). In this sense, independence also includes impartiality. Independence is required at all times in the design, conduct and reporting of research, although not necessarily in the choice of research topic and research question.

Responsibility means, among other things, acknowledging the fact that a researcher does not operate in isolation and hence taking into consideration – within reasonable limits – the legitimate interests of human and animal test subjects, as well as those of commissioning parties, funding bodies and the environment. Responsibility also means conducting research that is scientifically and/or societally relevant.

6.1.2 Standards

Chapter 3 of the Code of Conduct provides standards for good scientific practice on the following phases of the research process: design, conduct, reporting, assessment and peer review and communication.

Design
- Consider the interests of science and scholarship and/or society when determining the subject and structure of your research.
- Conduct research that can be of scientific, scholarly and/or societal relevance.

- Do not make unsubstantiated claims about potential results.
- Take into account the latest scientific and scholarly insights.
- Make sure that your research design can answer the research question.
- Ensure that the methods you employ are well justified.
- If the research is conducted on commission and/or funded by third parties, always specify who the commissioning party and/or funding body is.
- Be open about the role of external stakeholders and possible conflicts of interest.
- In research with external partners, make clear written agreements about research integrity and related matters such as intellectual property rights.
- As necessary, describe how the collected research data are organized and classified so that they can be verified and reused.
- As far as possible, make research findings and research data public subsequent to completion of the research. If this is not possible, establish valid reasons for their non-disclosure
- In the event of an investigation into alleged research misconduct, make all relevant research and data available for verification subject to the confidentiality safeguards established by the board of the institution.
- In highly exceptional cases, there may be compelling reasons for components of the research, including data, not to be disclosed to an investigation into alleged research misconduct. Such cases must be recorded and the consent of the board of the institution must be obtained prior to using the components and/or data in question in the scientific or scholarly research. They must also be mentioned in any results published.
- Ensure that the required permissions are obtained and that, where necessary, an ethical review is conducted.
- Accept only research assignments that can be undertaken in accordance with the standards in this Code.
- Enter into joint research with a partner not affiliated with an institution which has adopted this or a comparable Code only if there is sufficient confidence that your own part of the research can be conducted in compliance with this Code and the joint research results meet generally accepted principles of integrity in research.

Conduct
- Conduct your research accurately and with precision.
- Employ research methods that are scientific and/or scholarly.
- Make sure that the choice of research methods, data analysis, assessment of results and consideration of possible explanations is not determined by non-scientific or non-scholarly (e.g. commercial or political) interests, arguments or preferences.
- Do not fabricate data or research results and do not report fabricated material as if it were fact.
- Do justice to all research results obtained.
- Do not remove or change results without explicit and proper justification. Do not add fabricated data during the data analysis.
- Ensure that sources are verifiable.
- Describe the data collected for and/or used in your research honestly, scrupulously and as transparently as possible.
- Manage the collected data carefully and store both the raw and processed versions for a period appropriate for the discipline and methodology at issue.
- Contribute, where appropriate, towards making data findable, accessible, interoperable and reusable in accordance with the FAIR principles.
- Take into consideration the interests of any humans and animals involved, including test subjects, as well as any risks to the researchers and the environment, while always observing the relevant statutory regulations and codes of conduct.

- Keep your own level of expertise up to date.
- Take on only those tasks that fall within your area of expertise.

Reporting
- Do justice to everyone who contributed to the research and to obtaining and/or processing the data.
- Ensure a fair allocation and ordering of authorship, in line with the standards applicable within the discipline(s) concerned.
- All authors must have made a genuine intellectual contribution to at least one of the following elements: the design of the research, the acquisition of data, its analysis or the interpretation of findings.
- All authors must have approved the final version of the research product.
- All authors are fully responsible for the content of the research product, unless otherwise stated.
- Present sources, data and arguments in a scrupulous way.
- Be transparent about the method and working procedure followed and record them where relevant in research protocols, logs, lab journals or reports. The line of reasoning must be clear and the steps in the research process must be verifiable. This usually means that the research must be described in sufficient detail for it to be possible to replicate the data collection and its analysis.
- Be explicit about any relevant unreported data that has been collected in accordance with the research design and could support conclusions different from those reported.
- Be clear about results and conclusions, as well as their scope.
- Be explicit about uncertainties and contraindications, and do not draw unsubstantiated conclusions. Be explicit about serious alternative insights that could be relevant to the interpretation of the data and the research results.
- When making use of other people's ideas, procedures, results and text, do justice to the research involved and cite the source accurately.
- Avoid unnecessary reuse of previously published texts of which you were the author or co-author. Be transparent about reuse by citing the original publication. Such self-citation is not necessary for reuse on a small scale or of introductory passages and descriptions of the method applied.
- Always provide references when reusing research material that can be used for meta-analysis or the analysis of pooled data.
- Avoid unnecessary references and do not make the bibliography unnecessarily long.
- Be open and complete about the role of external stakeholders, commissioning parties, funding bodies, possible conflicts of interest and relevant ancillary activities.
- As far as possible, make research findings and research data public subsequent to completion of the research. If this is not possible, establish the valid reasons for this.

Assessment and peer review
- Be honest and scrupulous as an assessor or peer reviewer, and explain your assessment.
- Do not use information acquired in the context of an assessment without explicit consent.
- Do not use the system of peer review to generate additional citations for no apparent reason, with the aim of increasing your own or other people's citation scores ('citation pushing').
- Refrain from making an assessment if any doubts could arise regarding your independence (for example, because of possible commercial or financial interests).
- Refrain from making an assessment outside your area of expertise, or do so only in general terms.
- Be generous in cooperating with internal and external reviews of your own research.
- Do not establish a journal that does not apply the required standards of quality to its publications, and do not cooperate with any such journal.

Communication
- Be honest in public communication and clear about the limitations of the research and your own expertise. Only communicate to the general public about the research results if there is sufficient certainty about them.
- Be open and honest about your role in the public debate and about the nature and status of your participation in it.
- Be open and honest about potential conflicts of interest.

Standards that are applicable to all phases of research
- As a supervisor, principal investigator, research director or manager, provide for an open and inclusive culture in all phases of research.
- As a supervisor, principal investigator, research director or manager, refrain from any action which might encourage a researcher to disregard any of the standards in this chapter.
- Do not delay or hinder the work of other researchers in an inappropriate manner.
- Call attention to other researchers' non-compliance with the standards as well as inadequate institutional responses to non-compliance, if there is sufficient reason for doing so.
- In addressing research misconduct, make no accusation that you know or should have known to be incorrect.
- Do not make improper use of research funds.

6.2 Appendix II: Assessment form, rubric and learning agreement

The WU-thesis assessment form and rubric will be used to grade your thesis after completion. We encourage you to look at the assessment criteria at the start of your project. You can download the most recent version of the from this page: https://www.wur.nl/en/education-programmes/current-students/msc-thesis-msc-internship-and-msc-research-practice.htm or at this DOI.

The learning agreement is filled out in OSIRIS. To have an overview of the various topics covered in the learning agreement you can consult the checklist learning agreement. Information about the process in OSIRIS can be found in an interactive visual guide.

6.3 Appendix III: Intellectual property statement for student

In the learning agreement, one of the steps is that the student has to read and confirm the intellectual property statement below[6].

Introduction
It is important for you as a student to understand your rights and obligations concerning intellectual property and confidentiality. Please read this declaration and accept it by selecting 'yes' at the bottom of this page. If you have any further questions about intellectual property, consult info.eship@wur.nl.

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[6] Note that the text of this statement differs from the text used in academic year 2022-2023 and before

Declaration
1. The student shall own the (rights to the) MSc Thesis / Research Practice[7]. This does not encompass the information and materials provided by Wageningen University (and others) to the student. The student hereby grants Wageningen University the right to use the MSc Thesis / Research Practice for education and internal research purposes and the right to publish the MSc Thesis / Research Practice in the WUR e-depot.
2. Wageningen University remains entitled to and the owner of the information and materials provided to the student for the MSc Thesis / Research Practice project. The student shall keep these information and materials confidential for a period of five (5) years, starting on the date that this declaration is accepted.
3. The student will perform the MSc Thesis / Research Practice in accordance with the Netherlands Code of Conduct for Research Integrity.
4. The student will process any personal data in connection with the MSc Thesis / Research Practice in accordance with the instructions and regulations given by Wageningen University. More information can be obtained from privacy.student@wur.nl.
5. The student and Wageningen University can agree on an alternative ownership agreement, for example in case of a specific research assignment or in case of an internship. In that case, the other agreement shall take precedence over this declaration.

The acceptance and execution of this declaration by selecting 'yes' in the box below, recorded in the Student Information System of Wageningen University, Osiris), shall be deemed to be an acceptance with the same validity, enforceability and admissibility as an original signature.

I, the student, have read the above declaration, I fully understood it, and I agree to it.

6.4 Appendix IV: Information on student guidance and social safety

- Resources about student guidance, including the student deans, student psychologists, online training, etc.
- Information about social safety.

6.5 Appendix V: Checklist for organising a thesis

The checklist below serves as guideline of the steps involved. Please note that your chair group may have additional/different steps. You should be informed about that in the chair group specific part of the course guide.

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[7] Apart from the text of the report, this may also apply to **software and code** written by the student. Software and source code can be protected by copyright. If the student encodes or creates software as part of MSc Thesis / Research Practice process, the copyright to that code or software will rest with the student.
If the student **collects data**, there is no copyright yet. So as soon as that source data is shared with others, those others are allowed to use it without infringing student's rights. If the student makes creative choices in the structuring / ordering / selection of the data, it is possible that a copyright applies and that will also be due to the student.

- ☐ Are you allowed to start your thesis in terms of required study progress (some programmes require a minimum progress before you can start your thesis?
- ☐ Does the chair group(s) you would like to do your thesis occur in your programme (and specialization)?
- ☐ Do you meet the mandatory knowledge requirements for a thesis in the chair group? You can find those in the course description of that particular MSc thesis in the study handbook. Consult the thesis coordinator of the chair group, if in doubt.
- ☐ If you select courses to meet the mandatory knowledge requirements of the chair group, also check whether you still meet the requirements of your programme (consult your study adviser, if in doubt).
- ☐ Find a thesis topic.
- ☐ Check whether the topic of your thesis is consistent with your study programme (some programmes have requirements regarding admissible topics)
- ☐ Discuss the thesis topic with the supervisor.
- ☐ Start the OSIRIS process (https://wur.eu/tir-start)
- ☐ Check whether the country of research (if applicable) is a risk area or not.
- ☐ Discuss the requirements for your research proposal with your supervisor (length, depth etc.).
- ☐ Discuss your data management plan with your supervisor.
- ☐ Fill out the thesis learning agreement in OSIRIS and submit to your supervisor.
- ☐ Write a research proposal
- ☐ Ask your supervisor for feedback and approval of the research proposal.
- ☐ If applicable: arrange a date for the presentation of the research proposal.
- ☐ Arrange a meeting for a progress evaluation (the approximate date you already registered in the learning agreement)
- ☐ Arrange dates for the final assessment (handing in thesis report, final colloquium, examination).
- ☐ Provide the supervisor and examiner with a final version of your thesis report.
- ☐ Complete the thesis evaluation questionnaire.

Part B: Specific thesis information
Environmental Systems Analysis (ESA)
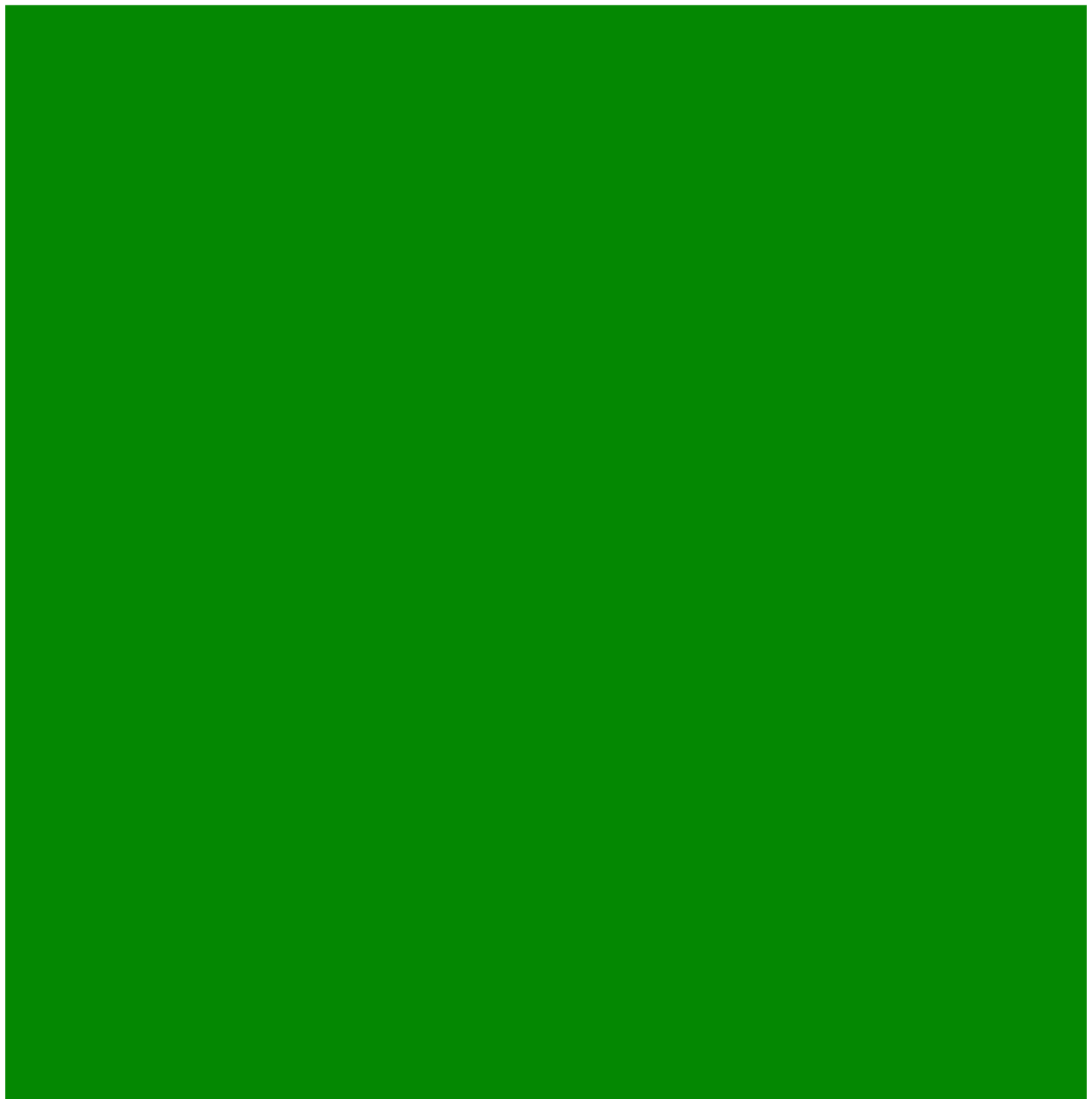
7 Introduction

Welcome to the Environmental Systems Analysis Group's specific part of the course guide. Before starting to do the thesis work, you should read this course guide carefully. It will inform you about what is expected: registration, supervision, facilities at the ESA group, and house rules are described. In addition to this information, you will find some guidelines for thesis writing. We refer to the generic guide (Part A) for other information.

7.1 Prerequisites

The ESA Group offers opportunities to obtain thesis credit points within among others MES, MUE, MCL, MTO and MBI. The prerequisites for a thesis depend on your MSc program (please check the study handbook). In principle and for most master programmes, the prerequisites for a thesis of 30 credits or more are:

Programme	Course	Prerequisition status
MES, MUE, MCL	- ESA-22806 Environmental Systems Analysis: Methods & Applications	Compulsory
MES	- ESA-31806 Nutrient and Pollution Management - ESA-31306 Regional Environmental Management - ESA-32306 Engaging & Modelling with Stakeholders	Restricted optional *(you must have passed at least one of these courses)*
MUE	- ESA-31306 Regional Environmental Management - ESA-32306 Engaging & Modelling with Stakeholders	Restricted optional *(you must have passed at least one of these courses)*
MCL	- ESA-31806 Nutrient and Pollution Management - ESA-31306 Regional Environmental Management	Restricted optional *(you must have passed at least one of these courses)*
MTO	- ENP-31006 Governance of Tourism & Natural Resources as part of the thematic trajectories Tourism & Natural Resources or Tourism & Global Change.	Compulsory
MBI students with specialisation C – Health & Disease	- REG-33306 Disease Ecology	Compulsory
MBI students with specialisation D – Ecology	- ENT-30306 Ecological Aspects of Bio-interactions	Compulsory
Other programmes should contact the ESA thesis coordinator		

For a thesis of less than 30 credits, please discuss the prerequisites with your supervisor. See study handbook for the most up-to-date info relevant to your specific program.

7.1.1 Other preparatory courses

It would be good to consider the thesis topic early in the study programme. If still possible, you are advised

to discuss recommended courses with your (intended) supervisor. If you would like to learn programming or understand the underlying program-codes of models, for example, it is recommended to follow the course INF-22306 (Programming in Python). Other modelling courses that may be of use, depending on your situation and plans, are MAQ-35806 (Earth Systems Modelling), ENR-21306 (Environmental Economics for Environmental Sciences), INF-31806 (Models for Ecological Systems). GRS-10306 (Introduction to Geo-Information Science) may also be relevant but can only serve as an <u>additional</u> course to your study programme. When in doubt, please consult your study advisor.

8 Examiners and daily supervisors

Theses are supervised mainly by the following staff members:
- Dr. Bas Amelung – bas.amelung@wur.nl
- Prof. dr. Rob Alkemade – rob.alkemade@wur.nl
- Dr. Solen Le Clec'h - solen.leclech@wur.nl
- Dr. ir. Karen Fortuin – karen.fortuin@wur.nl
- Prof. dr. Lars Hein – lars.hein@wur.nl
- Prof. dr. Niklas Höhne – niklas.hoehne@wur.nl
- Dr. ir. Marjolein Lof – marjolein.lof@wur.nl
- Dr. Kasper Kok – kasper.kok@wur.nl
- Dr. ir. Koen de Koning – koen.dekoning@wur.nl
- Dr. ir. Gerard Ros – gerard.ros@wur.nl
- Dr. Sophie Rickebusch – sophie.rickebusch@wur.nl
- Dr. Jannik Schultner – jannik.schultner@wur.nl
- Dr. Aritta Suwarno – aritta.suwarno@wur.nl
- Dr. Jana Verboom – jana.verboom@wur.nl
- Dr. ir. Arnold van Vliet – arnold.vanvliet@wur.nl
- Prof. dr. Wim de Vries – wim.devries@wur.nl
- Dr. Mengru Wang – mengru.wang@wur.nl
- Dr. Jantsje van Loon – jantsje.vanloon@wur.nl

For the personal profiles of each staff member see https://www.wur.nl/en/Research-Results/Chair-groups/Environmental-Sciences/Environmental-Systems-Analysis-Group/People.htm; for a list of possible thesis subjects see https://www.wur.nl/en/Research-Results/Chair-groups/Environmental-Sciences/Environmental-Systems-Analysis-Group/Education/Possible-thesis-subjects.htm.
The daily supervisor may be one of the staff members mentioned above, but can also be one of the group's PhD candidates. Moreover, it is possible that WSG staff supervise ESA thesis students, since WSG and ESA are part of the new group Earth Systems and Global Change (ESC); both groups work on environmental systems and there is plenty cross-collaboration between the old groups in both research and education.

9 Registration

9.1 Orientation meeting to select a topic

To select a topic, you should arrange an orientation meeting with one the thesis coordinators Dr. Aritta Suwarno or Dr. Jana Verboom to discuss the possible options for the thesis. To prepare for this orientation meeting, you should send in an overview of the followed courses and grades (updated transcript downloaded from OSIRIS). Regarding the research topic, you should have a look at the overview of the ESA research topics and possible thesis subjects available from our website (ESA Research topics and thesis subjects[8]). Depending on the outcome of this meeting, you may have a second meeting with a potential supervisor of the ESA group before deciding on the final topic of the thesis. In some cases, you will have two supervisors from our chair group, or a main supervisor from ESA and a co-supervisor from another chair group. The co-supervisor could also be a colleague from one of the Wageningen Research institutes, such as WENR (Wageningen Environmental Research).

9.2 Osiris and secretary registration

As described in Part A, you should **start the case in Osiris** and prepare the **Master Thesis Learning Agreement** to be approved by the supervisor. You should also register for the Thesis Ring through the coordinator Sverre Vink. Attending the thesis ring is voluntary but highly recommended.
You are also requested to **register** with the ESA secretary, Mathilde Witteveen (Mathilde.witteveen@wur.nl), via email or in person, who will then add you to the mailing list of ESA thesis students and send you relevant information and meeting invites.

9.3 Thesis Ring and Brightspace

In academia, peer feedback plays a vital role – not only for students but also for lecturers and researchers: it's easy to spot the errors in other people's work, while one tends to become blind for one's own shortcomings. For example, this course guide was much improved through peer feedback. Students are expected to participate in a Thesis Ring. The Thesis Ring aims to provide a supportive and encouraging peer learning environment in which work-in-progress is presented, reviewed and discussed. The Thesis Ring is facilitated by Sverre Vink (Sverre.vink@wur.nl). Please register with Sverre who will add you to a thesis ring and the thesis ring Teams environment and invite you for thesis ring meetings.

We will also add you to the Brightspace environment for thesis students. The proposal and final thesis should be uploaded in a Turnitin assignment via the ESA Brightspace web page called 'MSc Thesis & Internship Environmental Systems Analysis', to be found in Brightspace under 'Programme'.

Brightspace also has an option to submit a text for AI generated feedback. You can find this option under Feedbackfruits Automated Feedback. Remember the general rules for using AI as outlined on page 10. Your thesis report should contain an **appendix on the use of AI**.

9.4 Working place

ESA master thesis students can make use of our space designated for thesis students. You do not have to

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[8] Theses Environmental Systems Analysis (ESA) - WUR

register for these working places, as they operate on a first come first serve basis. Your supervisor and/or the secretary of the ESA group will show you the rooms.

10 Learning Agreement

You should develop and complete a Master Thesis Learning Agreement, with input from your supervisor, in OSIRIS. See Part A, Section 2.3 of this course guide.

In the process of developing and submitting the Master Thesis Learning Agreement, you could download and use the partly filled in Word version from the ESA website (ESA Master Thesis Learning Agreement[9]) and discuss details with the supervisor before copying the agreements into Osiris.

10.1 Data Management Policy

To ensure adequate and transparent data management and data storage, you are required to set up a Research Data Management Plan (RDMP) for the MSc thesis and to archive all of the files at the end of the process. The RDMP should be included in the MSc thesis contract under Point 7: "Arrangements on reporting". The data (including a readme file in the main folder that explains the files' contents) should be provided to the supervisor, and (s)he will archive it.

Please use the template for the RDMP. It is available on the ESA website, under Education Brochures and forms (https://www.wur.nl/nl/show/template-msc-thesis-data-management-plan.htm). Good data documentation ensures that:

- Data are organized appropriately to facilitate efficient data analysis and minimize errors.
- Data are self-explanatory and understandable to supervisors/project partners in order to facilitate communication and teaching.
- Data can be retrieved, understood and properly interpreted, now and in the future, as their relevant context is available.

10.1.1 Detailed guidelines on data files and folders

Since the projects within the ESA group generate data of a very diverse nature, we do not provide specific advice on file types to be used. However, you should make sure that the data are accessible from standard programs, such as Microsoft Excel (xlsx, .xls or .csv) or Notepad (ASCII files).

You should ensure to include a **readme file** that explains exactly what files are available in the project folder, so that people not involved in the project are also able to understand what is available and how the results evolved from the original data.

You should consider using folders named 'Original data', 'Calculations/scripts/interpretation', 'Final data' and 'Documentation' within the project folder. Folders could be set up according to the following guidelines. The project folder should contain your name.

Original data
- The 'original data' folder should contain original data only and no calculations;
- Missing values are indicated with a dot (e.g., in SPSS) or NA (in R). Any zero should be a true zero;
- Any changes to the data file (e.g., removal of an extreme outlier) should be recorded and the reason should be indicated, together with the originally obtained value (e.g., by insert comment). Note that extreme outliers can only be removed when there are strong indications that something went wrong (for example a value that is physically impossible, or in hindsight the sample appears

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[9] Theses Environmental Systems Analysis (ESA) - WUR see 'Master thesis learning agreement'

not to belong to the target population. Just the fact that the value deviates from the other data is not a good reason to omit it!);
- Do not mess with the original data. There is only one original data set and any changes made to that should automatically translate into changes in calculated values.

Calculations/scrips/interpretation
- Depending on the work's nature, you can have a "calculation" (e.g., calculations in Excel), "scripts" (e.g., model scripts) and/or "interpretation" (e.g., an overview of how qualitative data are summarised) folder.
- The 'calculations' folder includes all calculations. It should be clear how they are calculated from the raw data so do not "copy-paste to values"! Instead make direct links to the original values or information.
- All the scripts used to obtain the final data are stored in the 'scripts' folder.
- All manipulations used to summarise qualitative data are stored in the 'interpretation' folder.
- You should make sure that the calculations and scripts are understandable for others to allow for a complete reconstruction of the data analysis. Do add comment lines to explain what is calculated.
- Include the units of expression.
- As there is only one unique sheet containing the raw data, derived parameters will automatically be recalculated when there is a change in the raw data file.

Final data
- The 'final data' folder contains the data used as results from the previous calculations. The data can be used for statistical analysis, to make figures etc.
- Ensure that the data contain the correct number of decimals, so that they correspond with the precision of the observation.

Documentation
- This worksheet presents basic information about the project (title, persons involved) and a list of related files with metadata, original lab files, publications etc. The exact information required will depend on the project.

11 Proposal specifications

The proposal specifications and tips for writing a proposal can be found in <u>Annex B3</u>. Further, after your proposal is approved by your supervisor, you are required to present the proposal in a colloquium, by selecting a time through the Environmental Systems Analysis secretariat, taking into account the availability of your supervisor. Guidelines for the proposal presentation can be found in <u>Annex B7</u>. After the presentation, the supervisor may send the proposal to the thesis examiner for approval and extra feedback, when in doubt about the quality of the proposal. An insufficient proposal may have negative consequences for the progress evaluation – see <u>Section 3.5</u> of the course guide.

12 Report specifications

The thesis report should be written in English and should be as concise as possible: approximately 50 pages, including title page, table of content, references, and appendixes. The word limit for the main text (i.e., Introduction to Conclusions) is <u>20,000</u>. Write concisely and comprehensively and structure your thesis in a logical way! Additional material (e.g., questionnaires, model code and basic data) can be added

to appendixes. See annexes for more information and tips.

Please bear in mind that in thesis writing, most of the time is spent re-writing and revising. The thesis ring is a good place to get suggestions for improvement. Once the supervisor and you agreed that the thesis is ready (about 90% - 95% draft), you should ask one of your peer students to review this draft thesis. Further, you, the student, are required to start the process of presenting in a colloquium by selecting a time through the Environmental Systems Analysis secretariat. See below.

You are free to choose the format of the thesis report, but it should, in any case, be based on the following structure:

- Preface (optional);
- Summary;
- Introduction;
- Methods;
- Results (usually several chapters);
- Discussion;
- Conclusions (and recommendations);
- References; and
- Appendices.

During the reporting phase, you may produce different (intermediate) products:

(1) Annotated outline

At the beginning of the writing phase (usually 2-3 months before the end of thesis project) you should hand in an *annotated outline* of the thesis report. This is a document of a few pages with the complete table of contents and a brief description of the content of each chapter. You can take the outline that was part of the proposal as a basis for this annotated outline.

(2) Intermediate drafts

Depending on the topic and arrangements about supervision with the supervisor, you could write several drafts and discuss them. At least 6 weeks before the end of the project, you should have a *first comprehensive draft* of the thesis report, approximately 75% ready and containing all the basic information (but some elements may still be missing or need further analysis). This version will then be discussed in detail with the supervisor, who may suggest major changes in the structure and content but usually no new data should be collected after this date. This will also be a moment for reflection and evaluation of the thesis, to discuss if all is going according to plan and if the final result will (at least) be satisfactory.

(3) Semi-final draft

The *semi-final draft* of the report needs to be handed in as an MS-Word document to the supervisor at least two weeks before the end of the thesis project (and before the final presentation in the final colloquium). This version is almost finished (at 95% of the text ready) and only needs minor editorial work. Also, the summary is included. The supervisor can suggest changes to improve the final thesis. After the final presentation (see further), you will have restricted time to make the final changes before submitting the final thesis report.

(4) Final report

The *final report* needs to be available at the end of the project. You are required to hand in the final report to the supervisor and upload it in both Osiris and Brightspace – the latter for a plagiarism check. The final report will be discussed during a one-hour appointment with the examiner (see below). The role of the examiner is described in the part A of this course guide. The discussion focuses on the contents of the thesis, in which your knowledge, understanding, insights, as well as creativity and scientific attitude are

evaluated. You are expected to be able to place the results and conclusions in the context of the field of science and to indicate possibilities for applying the findings in practice. During this meeting you are also invited to evaluate the supervision received.

13 Oral presentations and thesis defense

13.1 Oral presentations

In our group, students give a 'start presentation', which is a presentation of the proposal, and a 'final presentation' (see Annex 7 for more details). The **start presentation** takes 10 minutes (plus 5 minutes for discussion), you can present your proposal after approval of your proposal by your supervisor. The **final presentation** takes 20 minutes maximum (plus 10 minutes for discussion). Usually about two weeks before the end of the project, you will present your thesis to other students, staff of the ESA Group and other people who are interested**. You, are required to make an appointment for a presentation with the secretary (Mathilde Witteveen,) of the ESA Group** (after consultation with the supervisor). **Note: the final colloquium can only be requested after the supervisor agreed upon the thesis and time**. The ESA Group secretary will forward an announcement for the presentation to all ESA students and staff. See annexes for more details.

The final presentation should at least include:

- the title of the thesis;
- outline of the presentation;
- introduction;
- aim of the study / research questions;
- method;
- results;
- discussion points; and
- conclusions (and recommendations).

13.2 Presentation attendance and reviewing

To stimulate discussion with fellow-students, and to practice reviewing other people's work, the student who is presenting his/her thesis should ask one fellow student to act as **"reviewer".** These reviewers will read the thesis and start the discussion after the presentation is finished. Reviewers should write a review including answers to the following questions:
- Is the presentation well structured?
- Is the content of the thesis well-presented overall?
- Were the results and conclusions clear?
- After reading the thesis and listening to the presentation, what questions does the student still have?

Note for the fellow student as a reviewer: Please ensure that you give constructive feedback. Give feedback in the same way you would like to receive feedback.

We expect all students to attend start and final presentations of their peers. **During the thesis project, you must attend at least four final thesis presentations, of which you must be reviewer of one.** Please download the attendance form for final presentations and make sure to get signatures of the supervisors of the presenters. **Without a completed form you will not be able to graduate**. Presentations can only be attended online, if you are not in Wageningen because of, for example, field work abroad. These online attendances should also be listed in the attendance form (without signature). Turn on your camera so we can see who is present in the audience.

13.3 Oral defense

You must provide the final version of the thesis and upload it into Osiris and Brightspace before the oral defense. **Note**: **examiners need at least one to two weeks to read the thesis, so you must upload the final thesis on time**. Making an appointment on short notice is often difficult, hence it is strongly advised for the student and the supervisor(s) to arrange the appointment with the examiner well in advance and consider that during some periods (e.g., the summer vacation in July and August) examiners may not be available.

The examination/oral defense will take ca. one hour. The examiner starts and asks most of the questions, the supervisor(s) can then also ask new questions or follow-up questions. The discussion focuses on the content of the thesis, in which your knowledge, understanding, insights, as well as creativity and scientific attitude are evaluated. The student is expected to be able to place the results and conclusions in the wider context of the field of science.
Afterwards, both supervisor and examiner compare their grades until they reach consensus on the final grade. By default, the grades are averaged in Osiris, but the examiner has the final say in this. The supervisor communicates the final grade and mentions the strong and weak points. As last agenda point before closing the meeting, you are asked to give feedback to the supervisor(s) about the supervision. The examiner finalizes the grade in Osiris, during or shortly after the meeting.

14 After completing the thesis…

- You are required to send the form 'attendance final presentations' and all result of the thesis work (data, computer programs etc.) with proper documentation to the ESA supervisor. In case the files are large, it is advised to use **SURFfilesender**. If the data are zipped, don't make the paths too long: too long paths prevent unzipping.
- The digital (pdf) version of the thesis and the DATA file, which are submitted to the ESA secretariat, will be archived. Wageningen theses will be uploaded in the WUR thesis library. You are asked for approval by Osiris whether your thesis should be published and if so, when.
- If the research findings are innovative and interesting, and the thesis has sufficient scientific quality, the supervisors and the examiners will stimulate you to use this thesis as a basis for a scientific publication. Depending on the available resources (e.g., time), you or the supervisor should take a lead in writing such a paper and submitting it to a peer-reviewed scientific journal. Generally, you and the supervisor will be co-authors. A publication can be used for additional outreach, such as an official press release, and will be an asset to your CV.
- Sometimes, a publisher will approach you to publish the thesis as a book. Wageningen University and the ESA Group **discourage** students from publishing their thesis in such a way. If you are approached by a publisher, we would appreciate it if you declined such an invitation. Such publishers don't always have good intentions. The same is true with invitations to present your work at a conference (so-called predatory conferences) or to submit a paper in a journal (so-called predatory publishers). If you want to pursue a broader publication and outreach of your thesis results, you should discuss this first with the supervisor!

Annex B1: the Writing Lab

Writing a thesis can be a challenge. Besides the feedback from the supervisor and peers in the thesis ring, the Writing Lab is for all BSc and MSc students at Wageningen University who can use some extra coaching and support for their written academic assignments, including MSc theses. The Writing Lab offers the following services, all free of charge:

- **One-on-one coaching sessions**, at any stage of the writing process.
- **Workshops**, including on reading literature, planning, revision, and tackling procrastination.
- **Thesis writing weeks**, helpful for motivation and accountability.

Students are encouraged to make use of the Writing Lab's services, including students that are confident in their writing abilities. We encourage MSc thesis students to book a one-on-one coaching session: e.g., when starting their thesis (for support in relation to topic orientation or developing an outline) and/or when starting their revision. Students are also encouraged to join the writing weeks and to attend workshops for deep dives into specific topics. Please visit the Writing Lab for more information and to book a coaching session.

Annex B2: ESA Facilities and house rules

- The Environmental Systems Analysis Group is located at Droevendaalsesteeg 3, Lumen Building no. 100, ground floor, C wing. The secretary is Mrs Mathilde Witteveen (email: mathilde.witteveen@wur.nl). The ESA group is part of the Earth Systems and Global Change group (ESC).
- Several desks are available for the students who work on their theses. The students are also encouraged to participate in the coffee breaks of the ESC group.
- The students must attend at least four colloquia of other students and peer review at least one thesis of another ESA student
- The students should register for and attend the Thesis Ring meetings. If the students are not able to participate in the thesis ring, this should be mentioned and motivated in the Master Thesis Learning Agreement.

Annex B3: ESA Guidelines for writing a research proposal

Usually, it takes about four weeks to write a project proposal of about 5 pages (max. 10, including possible appendices).

This proposal needs to include at least the following:

1. Title of the project

The title should be concise. It is usually a summary of the problem statement and may include a geographic reference to a specific case study area.

2. Introduction

The introduction includes the background of the problem, a 'problem statement', and provides an overview of the scientific literature[10], summarising what is known about the subject. It gives a brief reflection on the wider context of the research topic, the scientific and social relevance (why is it important) and how the research idea developed. It shows what is not yet known and still needs to be studied. The introduction is written in such a way that the study's purpose follows logically from the problem statement. It may serve as the basis for chapter 1 of the thesis report.

3. Purpose of the study

From the introduction and background, the purpose of the study can be formulated. This is the scientific formulation of what will be achieved in the research. It is followed by a number of research questions that will be answered in order to meet the purpose of the analysis. This formulation of the purpose and research questions will also be used in chapter 1 of the thesis. The analysis of the study should focus on answering the research questions.

4. Method(s)

A description is given of how the research questions will be answered. The research method(s) and tools used are described and should explain why these are the most appropriate for the study. In systems analysis, the research method is often a combination of for example literature study, interviews, modelling, fieldwork, etc. This description of the method may serve as the basis for Chapter 2 of the thesis.

5. Planning

This section should give a description of the planning. It shows for each research question when it is to be answered and when draft chapters of the report are due. It also includes time for comments and re-writing and indicates when presentations are held. The planning may also include a strategic research plan, discussing for example, where the research will be carried out (e.g., fieldwork-site), which organisations will collaborate (if applicable), who will do what (in case of a group-project) etc.

6. Supervision

The names of the WUR supervisor(s) are mentioned here as well as possible supervisors or contact people in the fieldwork-site (this can be part of the title page of the proposal).

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[10] Use WUR library search options and other search programs

7. Draft table of contents

The proposal includes a draft table of contents of the thesis. The thesis chapters are referred to in the planning (e.g., a GANTT chart).

8. References and contacts

Make a list of background literature used and the contacts (organisations/persons) that will be used during field work for example to visit for interviews

9. Data management plan

Use the data management template to add a data management plan.

Annex B4: Guidelines for writing an ESA thesis report

To some extent, you are free to choose the format of the report, but it should, in any case, be based on the following structure, and should be as concise as possible. The main text should preferably be less than 50 pages, with a word limit of 20,000, if necessary, followed by a flexible number of pages for Appendices. For writing your thesis it might be helpful to go through a thesis of a former student of ESA.

Title Page (see Annex B6)

Preface (optional - usually less than 1 page, max. 2 pages)
This section provides the institutional context of the study and may describe why you did this research (e.g., how you became interested in the subject). It may include some personal notes on your project and should include acknowledgements of people who supported you. According to the university's guidelines, you have the opportunity to also acknowledge religious or political-ideological inspirations that you experienced. Statements about religion or politics other than related to the support you experienced are not allowed. Please have the acknowledgements approved by your supervisor before submitting the final version of your thesis.

Table of Contents (preferably 1, max. 2 pages)
The table of contents should be clear and preferably only included headings of maximum 3 digits. It can be generated automatically using Word Heading styles. Lists of Figure, Tables and Appendices can also be added.

Summary (1 page max (or 750 words))
This section summarises your research. It includes some background information, the aim of the study, a short description of the methods used, the most important results of the project and the major discussion points, and conclusions. In the summary you normally use past tense.

Introduction (max. 7 pages)
The introduction (or Chapter 1 of your report) can be largely based on the research proposal. It includes background information (scientific and societal context) and an overview of the most important scientific literature, defines the main terms and concepts used, and describes the current state of the knowledge on the topic of your thesis. It also shows what is unknown or poorly known at present. Then the actual problem statement is specified. From this, the purpose of your study should follow logically, as well as the research questions that will be addressed. The introduction ends with a short outline of the rest of the thesis report. This outline specifies how the different chapters are structured and linked. Present tense should be used to write the problem statement. The review of literature to describe the current state of knowledge on the topic should be written in past tense (as in "Studies showed that ..."), or in the present perfect tense if it is common knowledge (e.g. Studies have shown that...").

Method(s) and literature review (suggested maximum, 8 pages; discuss with supervisor if you think more are needed)
This section describes how you addressed the research questions and what methods you used. The selection of specific methods must be clearly motivated, and you should discuss examples of alternative methods/approaches. It may include a description of your research area, or a description of the models that you used or the scenarios that you formulated. All (main) statements must be clearly supported by literature references. Also clearly describe the assumptions you have made. To describe the methods you used, use the past tense.

Results (as many pages as needed)
The results are usually presented in several chapters. These chapters present your results – your findings - in a clear and concise way. It does not yet draw conclusions. The results are presented as much as

possible in tables and figures. It should be very clear to the reader what results are part of your study, and what parts are from other, existing studies or literature. The results are presented in such a way that they logically refer to the research questions formulated in Chapter 1. Use the past tense to describe your results.

Discussion (max. 5 pages)

After having described the results, they need to be discussed. This means that you critically address them. First of all, you need to tell the reader about any weaknesses in your approach/methods and the consequent uncertainties in the results and relate these weaknesses to your conclusions. You should indicate which weaknesses affect your conclusions most. Discuss the weaknesses in such a way that they cannot be used to criticise your research and its conclusions. Secondly, you need to convince the reader that, despite the weaknesses, your approach was appropriate and your results reliable (under the given restrictions). Finally, you need to compare your results to those of other research papers and reports and discuss the differences and similarities. What do they imply for your conclusions?

A smart way to draft your discussion is to first summarise the answers to your research questions and draft your final conclusions. Then criticise your own conclusions (e.g., too little data; not the most appropriate methods; major uncertainties remain; or the conclusions differ from those in other studies) and discuss how these criticisms influence your findings or why they (i.e., the criticisms) are less relevant. You can also indicate in the discussion section how additional research could improve on your results (e.g.: "*Although my limited dataset specified a clear trend, collecting more data would enhance precision*"). This way, your discussion chapter comprehensively links the result chapters and the conclusion chapter and convinces your audience of the robustness and trustworthiness of your results, findings and conclusions. Use the present tense to discuss your results, the uncertainties of your research and to compare your results to results of other research papers and reports.

Conclusions (max. 5 pages)

This chapter draws conclusions from the results. Brief answers are given to each research question. The final paragraph of the conclusions provides the synthesised conclusion(s) that address the aim of the study. Use the present tense in the conclusion section.

In addition, recommendations may be formulated for (a) further research, (b) policy makers and/or (c) management implications. If you provide recommendations, your objectives must state that you will give recommendations and clearly identify to whom. NB don't end your thesis with a statement that "more research is necessary" because that will always be the case. If the weaknesses in your research ask for more research, you better state that in the Discussion section.

References

Cite only references that are relevant and necessary. Make sure all references listed at the end of the thesis are actually cited in the thesis, and check for accuracy of dates, authors and sources. Avoid citing references that no one else will be able to find (from unpublished sources, for example). The purpose of a good reference list is to allow other scientists to check the reliability of your sources. This means that only retrievable sources should be cited (i.e., no websites).

- The reference list should be consistent and complete and include the main scientific papers, books, book chapters and reports that have been published on the topic of your thesis. Only include references in your list that you used in your text.
- Use a consistent style throughout the report (see below) and preferably use EndNote (or similar reference management software) to manage and generate the reference list.
- Do not use footnotes for your references.
- Please do not use general websites in your reference list because information of websites cannot be checked. Usually there is a report or paper behind a website that you should cite. In case you cannot find the original source, you could add the website and the date accessed to the main text of your thesis. Please add a footnote and do not add the website to your

reference list. The only exceptions are reliable websites that provide official data (e.g., Agrostat and CBS).

In the text, you usually refer to another study as follows:
- In the case of one author: (Leemans, 2012);
- In the case of two authors: (Leemans and Amann, 2012); and
- In the case of more than two authors: (Leemans *et al.*, 2012).

The format of the reference list is up to you, but should follow a generally accepted format and in any case include:
- Name of author;
- Year of publication;
- Title of publication;
- Journal name and volume number, or report name and number;
- Pages; and
- In case of books and reports: name and place of publisher.

Please consult some scientific articles to choose a format that you like.

Figures and tables
Include only figures and tables that are necessary. Do not present the same data in both a table and a figure.
- Make sure figures and tables are clear, legible and relevant. Each should be self-explanatory from its caption and legend. Because all figures are explained in a caption, titles are not needed.
- Avoid including extraneous details (lines or data). One well-designed figure or table may save a thousand words, so try to let it speak for itself and avoid unnecessary words to describe what it shows (in the caption as well as in the text).
- All the data is explained in the figure and the precision of the data is indicated by the numbers on the axes. Do not add the actual values in a table below the figures (an Excel option). Each axis in a figure must be clearly labelled and its units must be specified.
- Clearly refer to the source: in case you copied the entire table or figure from another publication you should cite the original source and even require official permission to copy it! Most texts, figures and tables from scientific papers and books fall under copyright. Often you will adapt a figure or table from another source, or several sources. In that case you write "adapted from ….", or "based on".
- The easiest way to insert figures is to cut/paste them as bitmaps. Then you can always easily scale them and control the text flow around the figures. Complex figures including maps, boxes, arrows and other elements, you can always first create in PowerPoint and then copy and paste them into word as a single bitmap (edit → paste special → bitmap). If you would like to also use the figures in your presentation and/or in a scientific publication, you better save them one by one. For printing and conversion to .pdf it is best to use .eps files. This format is generally also required by publishers. If you keep your thesis file in word format, and in your presentation, it is better to use .jpg format. When you save these formats, keep in mind what size you would like these figures to be. You can easily make figures and switch between formats using the open-source programme Gimp, or, if you have a licence, Photoshop.

Equations
- Equations should be formatted with the equation editor. Like figures and tables, all equations should also be numbered (e.g., Eq. 1) sequentially;

- Be aware the using an 'x' or '*' as a multiplication sign is confusing as these symbols are often also used for other purposes. Use the proper multiplication sign ('•');
- When you have defined an equation, you specify all the different variables and their units;
- Please check that the units on the left side of the equations match the units on the right side.

Appendices

Provide additional material and tables that adds to the findings, that provides source codes etc. Major results should never occur in an appendix.

Annex B5: Some extra tips and tools for academic writing

This document will provide an overview of key considerations, tips, and tools for each of the writing phases, to help guide your own writing during your thesis. The information is based on experiences and resources from the WUR Writing Lab and de Jong's (2017) *Effective Strategies for Academic Writing*. The writing process consists of three main and distinct phases: preparation, writing, and revision (Figure 1).
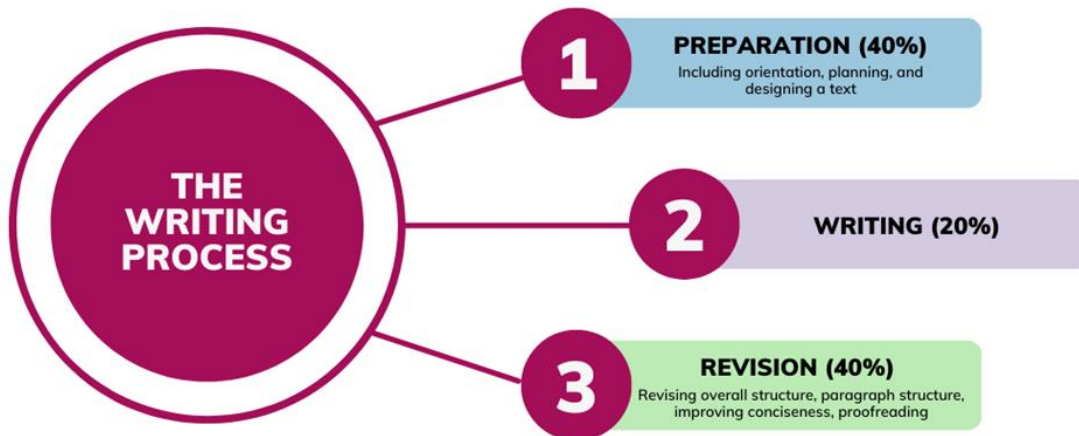
Figure 1. The three main phases of the writing process.

Three considerations are critical to remember when it comes to the writing process:
1. **40-20-40 rule**. A good rule of thumb is to spend 40% in the preparation and revision phase, and 20% in the writing phase.
2. **The phases are separate processes**. Mixing phases will make the writing process less efficient. For example, if you mix the writing and revision phases (i.e. after writing a sentence in a paragraph, you work on rewording it or finding a specific word or phrase to add, before moving on to writing the next sentence), it will take you far longer to write the paragraph. Moreover, by forcing yourself to be critical (revision) during a fundamentally creative process (writing), you also risk blocking and limiting your ideas.
3. **Iteration is an inherent part of writing**. This also means moving back and forth between the phases. For example, after writing, you may realize you need to adapt something in the outline (preparation).

A note on structure
Structure is one of the key features of an academic text like a thesis; a clear structure ensures that your reader is able to follow and understand your arguments and narrative. There are three main parts for which thinking about structure is key:
1. The overall structure of your entire thesis, chapter, and section
2. Paragraph structure
3. Sentence structure (related to grammar)

Overall structure
An effective overall structure means that your text is **coherent**- each section and paragraph should flow logically from one to the next. This means that the sequence of sections and paragraphs needs to be in a **logical order**. It also necessitates **clear connections** between the parts. Key tools to help with this part of writing are outlining (see Preparation) and reverse outlining (see Revision).

Paragraph structure

A paragraph consist of the following main elements:
- **Topic sentence**: the main idea of the paragraph
- **Body**: these sentences support your topic sentence and develop your main point
- **Conclusion**: concluding sentence that summarizes the main point

When it comes to paragraph structure, one golden rule to follow is to keep **one key message per paragraph**, which should be reflected in your **topic sentence** at the beginning of the paragraph.

Preparation

Good preparation before starting to write is key for efficient and effective writing. It ensures that the writing phase goes smoothly and makes the revision phase easier. As part of your proposal, you will need to give a detailed plan of your thesis process, such as with a Gantt chart. However, there are other steps that are equally important when it comes to preparation, including outlining and reading literature.

Outlining
Developing a **detailed outline** *before* you start the writing phase is one of the simplest ways you can ensure the writing process goes smoothly, as it allows you to **effectively structure your writing**. You can begin developing an outline once you have decided on your research topic and question(s), and have conducted some preliminary reading of the literature. The main steps to developing an outline are illustrated in Figure 2. We recommend developing an outline for each of the chapters in your thesis and proposal. Although you can- and most likely should- **adapt your outline** as you continue throughout the writing process (e.g. if you find you need to include another main idea, or that a different order is more intuitive), using it as a guide will prevent many of the most common writing issues students encounter.

Figure 2. The main steps to developing an outline for your text.

Reading literature

Making your way through scientific literature can feel like a daunting task. Fortunately, there are tools to support this process. One tool is the **literature matrix**. This is a table that you can use in a program like Excel to **keep track of the literature** you read and to **focus your reading** to what is most pertinent to you. This makes your reading of the literature more targeted and efficient, and it makes the writing phase go much easier, as you can easily find the most important points relevant to your topic and questions.

There are different ways to organize a literature matrix, so it is helpful to think about the type of matrix that would work best for your purposes. Two examples are included below in Table 1 and 2.

Table 1. Example of a literature matrix. This type of literature matrix is especially helpful to focus your reading of the literature on the information that is most relevant for you.

	Article 1: Author (year)	Article 2: Author (year)	Article 3: Author (year)
Subquestion 1.1 What are the ecosystem services (ES) marine ecosystems provide?	3 ES: a. … (p. …) b. … (p. …) c. … (p. …)	4 ES: a. … (p. …) b. … (p. …) c. … (p. …) d. … (p. …)	3 ES: a. … (p. …) b. … (p. …) c. … (p. …)
Subquestion 1.2 How does climate change affect the ecosystem services provided by marine ecosystems?	2 effects: a. … (p. …) b. … (p. …)	4 effects: a. … (p. …) b. … (p. …) c. … (p. …) d. … (p. …)	1 effect: a. … (p. …)

Table 2. Example of a literature matrix. This type of literature matrix can be helpful when wanting to keep track of key information. The headers are examples of information to include, and are not comprehensive.

	Research Objective	Theoretical framework	Key findings	Future research	Relevance to own research
Article 1: Author (year)					
Article 2: Author (year)					

Writing

A challenge common to many students when starting the writing phase is writer's block. There are many different tips and tricks that can help you overcome writer's block, such as writing in a different environment, working on writing something else (e.g. a different paragraph), or looking for inspiration (e.g. talking about your topic with a friend, reading). In this section, we will focus specifically on a technique called **freewriting**.

Frequently, writer's block relates to either not knowing what to say, or not knowing how to express what to say. The process of writing itself can help you in figuring this out- if you make the room for creativity. This is where (focused) freewriting comes in – as a technique for **writing to think**- in contrast with writing for someone else to read. The point of this technique is to keep writing, never going back to edit. This frees up your mind to be creative and come up with ideas, that often would not be able to emerge in linear ways of writing. The steps for freewriting are illustrated in Figure 3.
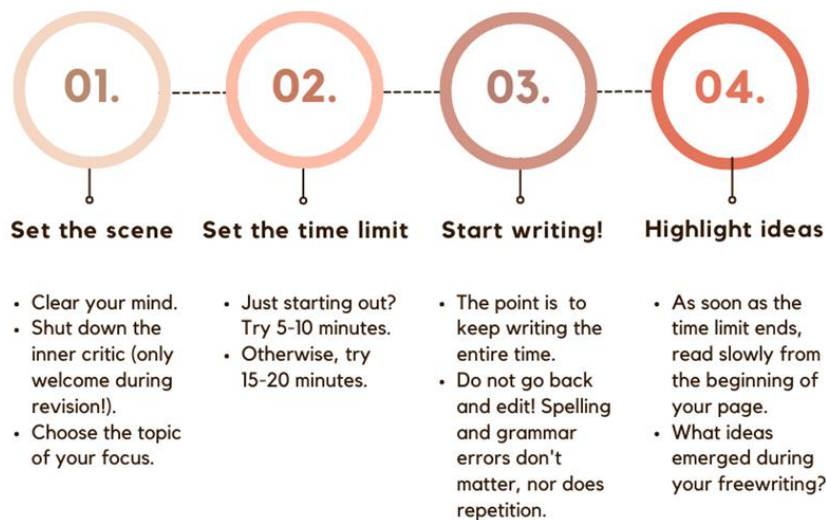
Figure 3. The main steps to freewriting.

Revision

Revision is about ensuring that everything in your text supports and clearly conveys its overarching purpose. Revision is most effectively done if you re-read your text with a specific revision purpose in mind- as opposed to aimless re-reading! Similar to the different types of structure in a text, there are different levels upon which you need to focus your revision.
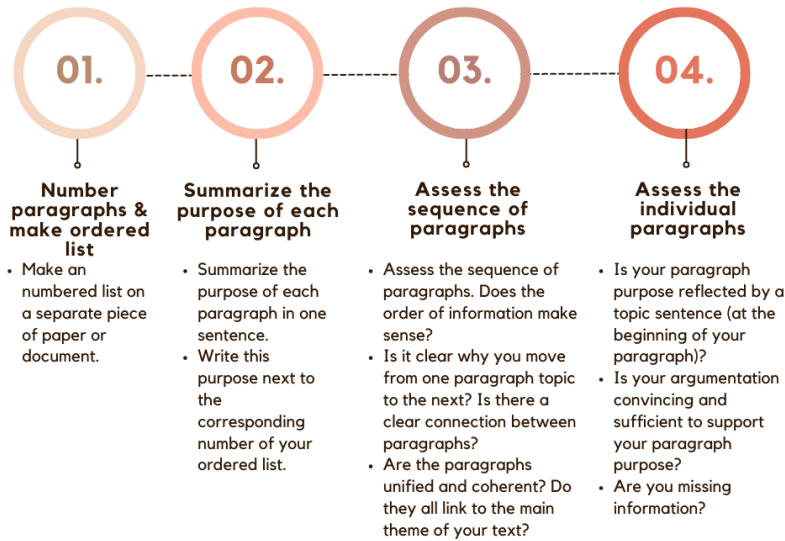
1. Overall structure of the chapter or section (e.g. logical sequence of paragraphs)
2. Paragraph structure and argumentation (e.g. clear topic sentence reflecting the purpose of the paragraph)
3. Sentences (e.g. meeting criteria for academic writing)
4. Final proofreading

Two tools can be particularly helpful during your revision phase.

Reverse outlining

Reverse outlining is a tool with which you revise the structure of your text by reconstructing an outline. Figure 4 illustrates the main steps.

01.	02.	03.	04.
Number paragraphs & make ordered list	**Summarize the purpose of each paragraph**	**Assess the sequence of paragraphs**	**Assess the individual paragraphs**
• Make an numbered list on a separate piece of paper or document.	• Summarize the purpose of each paragraph in one sentence. • Write this purpose next to the corresponding number of your ordered list.	• Assess the sequence of paragraphs. Does the order of information make sense? • Is it clear why you move from one paragraph topic to the next? Is there a clear connection between paragraphs? • Are the paragraphs unified and coherent? Do they all link to the main theme of your text?	• Is your paragraph purpose reflected by a topic sentence (at the beginning of your paragraph)? • Is your argumentation convincing and sufficient to support your paragraph purpose? • Are you missing information?

Figure 4. The main steps of reverse outlining your text.

Criteria for academic writing
Instead of reading sentences without a specific focus on what to revise, one technique used by The Writing Lab is to read and revise sentences based on criteria for academic writing. Some typical criteria for academic writing include:

- Supported by evidence
- Precise
- Concise
- Formal

When reading your text, you can use criteria such as the ones listed above as a "checklist", to make sure your sentences meet the standards of academic writing.

Annex B6: Title page of thesis report

Title

Name of student

MSc Thesis in …….[*add study program*]

Year and month

PICTURE or DRAWING to illustrate the thesis-topic (to be selected by student).

Supervised by: _____ [*name of daily supervisor*]

Course code: ....

Environmental Systems Analysis

WAGENINGEN UNIVERSITY

[First true page of thesis report]

Title of the thesis

Name of Student
MSc Thesis in ……………[add study program]
Year and month

Supervisor(s):   **Examiner:**

1) ……………………(ESA)   1) …………………… (ESA)

+ contact details   + contact details

2) …………………… other WUR group

(or other Univ)

+ contact details

+ ……………...*name of other dept./org. & supervisor (if applicable)*

Annex B7: Guidelines for preparing an oral presentation

The oral **proposal** presentation should be 10 minutes maximum, followed by 5 minutes discussion. It should at least include the following:
- Background information;
- The problem statement;
- Objective of your research;
- Research questions;
- Methodology that you will apply;
- Planning of your research.

The **final** oral presentation (colloquium) should be 20 minutes maximum, followed by 10 minutes discussion. It should at least include the following:
- One slide showing the title of your thesis, your name, other information you wish to add;
- Outline of the presentation: One slide telling the audience what they can expect;
- Introduction: One – two slides giving some background on the thesis subject;
- One slide presenting the aim of the study / research questions that will be answered;
- Method(s): A few slides giving details on the method(s) you used;
- Results: Several slides, presenting your results;
- Discussion: One or two slides with the main discussion points (e.g., problems encountered or uncertainty in results); and
- Conclusions (and recommendations): One or two slides, addressing your research questions and drawing conclusions and, optionally, the main recommendations.

It is important to prepare your slides carefully. Some general recommendations:
- Use a large font size (at least 24 points);
- Do not use too many lines;
- Make sure your slides only contain information that you really talk about; and
- Graphs usually are easier to read by the audience than tables.

It is important to practice your presentation several times before you actually give it. When presenting, please take into account the following:
- Do not stand with your back turned to the audience (look at the audience);
- Talk slowly, give the audience time to think;
- When presenting graphs and tables, take your time to tell the audience what it presents before you start to talk about their content (e.g., when presenting graphs, first explain the x and y axis, before you start to talk about the results);
- When presenting tables, be aware that the audience will not have time and energy to remember all the numbers that are in there. Decide in advance which numbers you think are important in the table, and focus your discussion on them; and
- Use a pointer if you present tables and graphs, to make sure that the audience knows what you are talking about, or highlight (e.g., circle) the elements on which you want to focus in the slide.