# Climate Studies

**Faculty of Agricultural and Environmental Sciences, Wageningen University**

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This report was finalized on 27 September 2012

# Report on the master programme Climate Studies of Wageningen University

This report takes the NVAO's Assessment Framework for Limited Programme Assessments as a starting point.

## Administrative data regarding the programme

**Master programme Climate Studies**

| | |
|---|---|
| Name of the programme: | Climate Studies |
| CROHO number: | 60107 |
| Level of the programme: | master |
| Orientation of the programme: | academic |
| Number of credits: | 120 EC |
| Specializations or tracks: | 11 |
| Location(s): | Wageningen |
| Mode(s) of study: | full time |
| Expiration of accreditation: | 31-12-2013 |

The visit of the assessment committee Climate Studies to the Faculty of Agricultural and Environmental Sciences of Wageningen University took place on 10 April 2012.

## Administrative data regarding the institution

| | |
|---|---|
| Name of the institution: | Wageningen University |
| Status of the institution: | publicly funded institution |
| Result institutional quality assurance assessment: | positive |

## Quantitative data regarding the programme

The required quantitative data regarding the programme are included in Appendix 5.

## Composition of the assessment committee

The committee that assessed the master programme in Climate Studies consisted of:

- Prof. F. Zwarts (chair), professor at University of Groningen and professor and manager at University Campus Fryslân;
- Mrs R.L. Prenen, MSc, independent educational adviser;
- Prof. P.P.J. Driessen, professor of Environmental Studies at Utrecht University;
- Prof. I. Janssens, professor at the Plant and Vegetation Ecology department of Antwerp University, Belgium;
- Mrs K. Bak Nielsen, master student in Geography and Mathematics of Roskilde University, Denmark.

The committee was supported by Mrs Dr M.J.V. Van Bogaert, who acted as secretary. The day before the site visit, Mrs Bak Nielsen fell ill, so she could not take part in the site visit. She provided written input to the secretary, which was used during the site visit. She furthermore commented on the draft report and approved of the final report. Appendix 1 contains the curricula vitae of the members of the committee.

## General information regarding Wageningen University

*Educational programme assessments in Life Sciences at Wageningen University*
A total of 31 educational programmes of Wageningen University which could not be included in a national disciplinary assessment had to be assessed in 2012 in order to apply for reaccreditation. In consultation with QANU, Wageningen University decided to divide the work among fourteen committees in the period between March and July 2012. For each site visit different expert committee members were invited to assess the programmes. In addition to the expert committee members, two non-expert committee members were involved as core members in all site visits and programme assessments. These non-expert committee members were the chairman, Prof. F. Zwarts, and the educational expert, Mrs R.L. Prenen, MSc. This construction was chosen to guarantee consistency between the fourteen assessments as well as to respect the diversity between the programmes. Prior to the site visits an extended kick-off meeting was held in February 2012, during which subjects applicable to all programmes were discussed (for the programme, see Appendix 6). In addition to the core members of the committee, an expert member (Prof. E. Van Damme), a student member (Mrs T.I.E. Veldkamp, BSc) and both secretaries to the committees (Dr M.J.V. Van Bogaert and Mrs M. Maarleveld, MSc) were present. During the kick-off meeting, interviews were held with representatives of the Education Institute, Programme committees, study advisers, Examining Boards and alumni. The findings of the kick-off meeting were used as input for the fourteen site visits and are incorporated in the committee reports on the 31 educational programmes. Based on the information received in the first five site visits, the core committee members held another interview with the Examining Boards and a selection of study advisers. This meeting was held on 6 June 2012 and provided additional insight into the functioning of and relation between the Examining Boards and study advisers.

*Wageningen University*
Wageningen University is comprised of one faculty, the Faculty of Agricultural and Environmental Sciences. The Faculty consists of 80 chair groups, arranged in five departments. All educational programmes, bachelor and master, are organized by the Education Institute (OWI). The Board of the OWI is responsible for the content, quality and finances of the educational programmes. Every programme has a programme director and a programme committee, consisting of equal numbers of students and academic staff. The programme committee is responsible for the content and quality of the programme, though in a formal sense this is subject to approval by the Board of the OWI. The programme director is responsible for the realization of the programme.

The courses are provided by staff of the chair groups, the 'supply side'. The programme committees are considered the 'demand side', with the programme director being the 'matchmaker'.

Wageningen has four Examining Boards, usually consisting of five to eight people from different disciplines. Before the site visit period, these boards were in the process of strengthening the quality management of assessment processes and procedures.

Each programme has one or more study advisers, who are tasked with supporting students throughout their study career. Study advisers provide information and invite students for progress evaluations and meetings to plan the student's individual curriculum. Each student needs the study adviser's approval for the elective parts of the programme s/he has chosen.

*Internationalization*
Wageningen University has an international reputation, in terms of both research qualities and the number of international master students. The committee especially considered the latter point since there are both possible drawbacks and advantages to having many international students. Extensive discussions during the site visits made it clear to the committee that despite the fact that it will always be difficult to assess the quality of enrolling international students, the programme managements are well aware of the imperfections of its procedures and have tightened the selection in the past few years. Overall the committee thinks that the advantages of having many international students outweigh the disadvantages.

## Working method of the assessment committee

*Preparation*
After receiving the critical reflection, the project manager checked the quality and completeness of the information provided. After approval, the critical reflection was forwarded to the committee, in both printed form and digitally. In addition, the committee members selected and read a total of 15 theses for each programme that was assessed (see Appendix 7).

Before the site visit the project manager created a draft programme for the interviews (see Appendix 6). The draft programme was discussed with the chair of the committee and the coordinator of the Education Institute. As requested by QANU, the programme directors carefully composed a select and representative panel for all interviews.

*Site visit*
During the initial meeting at the start of each site visit, the committee members discussed among themselves their findings regarding the critical reflection and the theses. They also discussed their task and working methods and the proposed domain-specific requirements (see Appendix 2).

During the site visit, interviews were held with representatives of the programme, students, staff members, and Programme committee. The Examining Boards and a representation of the Wageningen University study advisers were interviewed in the extended kick-off meeting, as can be read on page 6. The committee also received additional information, for example, study books, course guides and reports from the meetings of the Programme committee. This information was examined during the site visit. When considered necessary, committee members could read additional theses during the site visit. A consultation hour was scheduled to give students and staff of the programmes the opportunity to talk to the committee. No requests were received for the consultation hour.

The committee used part of the final day of the site visit to discuss the assessment of the programmes and to prepare a preliminary presentation of the findings. The site visit concluded with an oral presentation by the chairman of the general assessment and several specific findings and impressions of the programme.

*Report*
After the site visit the project manager wrote a draft report based on the committee's findings. The draft was first commented upon by the committee members and then sent to the faculty to check for factual irregularities. All comments made by the faculty were discussed with the chair of the committee and, if necessary, with the other committee members. After revision, the report became official.

*Decision rules*
In accordance with the NVAO's Assessment Framework for Limited Programme Assessments (as of 22 November 2011), the committee used the following definitions for the assessment of each individual programme, both of the standards and the total programme.

**Generic quality**
The quality that can reasonably be expected in an international perspective from a higher education bachelor or master programme.

**Unsatisfactory**
The programme does not meet the current generic quality standards and shows serious shortcomings in several areas.

**Satisfactory**
The programme meets the current generic quality standards and shows an acceptable level across its entire spectrum.

**Good**
The programme systematically surpasses the current generic quality standards across its entire spectrum.

**Excellent**
The programme systematically well surpasses the current generic quality standards across its entire spectrum and is regarded as an (inter)national example.

## Summary judgement

This report provides the findings and considerations of the Life Sciences committee on the master programme in Climate Studies at Wageningen University. The committee assessment is based on information in the critical reflection, interviews during the site visit and a selection of theses.

**Standard 1: Intended Learning Outcomes**
The master programme in Climate Studies combines the knowledge and expertise from three domains: Earth Sciences, Life Sciences and Social Sciences. The focus of the programme is on contemporary processes of land-atmosphere interactions. In the programme students specialize, extend and deepen their knowledge and skills in the field of climate change. For this they can choose a specialized programme, or a broader programme. The focus on social aspects makes this programme unique in the Netherlands.

The committee is impressed by the domain-specific framework which clearly describes the field covered by the programme. It provides an excellent framework of the discipline. However, from the documentation it is not yet clear where the programme positions itself in this schematic framework. The intended learning outcomes are general, though satisfactory. The committee advises to differentiate between the tracks in the intended learning outcomes, as well as to highlight the common aspects between them. Both level and orientation are academic. In addition, the professional field is sufficiently involved.

The programme is ambitious and aiming at high quality. Each of the eleven tracks are coherent and of high quality. However, the coherence of the entire programme is not yet optimal. The committee advises to formulate objectives that will also provide external stakeholders with a clear view on the entire programme as well as on the individual tracks.

**Standard 2: Teaching-Learning Environment**
All Wageningen programmes provide a lot of freedom to the individual student, while at the same time chair groups and their research strongly influence the courses offered. To a large degree students compose their individual programmes in consultation with the study adviser, giving the latter a crucial role in supporting students in composing their programmes, including specialization track and elective choices. By the end of 2011 the study adviser was replaced and students claim that the new study adviser is functioning well. Students and the committee appreciate the freedom that is given, but with a total of 90 credits being (restricted) optional, the coherency of the programme as a whole is difficult to assess. The committee is convinced, however, that the eleven tracks are all relevant to the programme, coherent by itself and of high quality.

The relation between intended learning outcomes and the components of the curriculum is present and provided in a matrix in the critical reflection.

The programme strongly focuses on multidisciplinarity and at the same time allows students to become specialists. The committee is convinced that the programme communicates a multidisciplinary nature without loss of specialization.

An adequate mix of teaching methods is used throughout the programme, for some courses the committee is impressed by the combination of teaching methods. The committee thinks that the programme is still working towards the optimal curriculum, regularly improvements are made. The programme has a very beneficial student-staff ratio. Many staff members are

involved who overall have high research capabilities. This is reflected in the high quality of the individual courses and the quality of the theses. Facilities are good.

Study load is high, but acceptable and the output is good. The number of students steadily increases, but remains low.

**Standard 3: Assessment and achieved learning outcomes**
The committee is very positive with regard to the initiatives the Examining Boards of Wageningen University are currently implementing in its programmes. The Examining Boards are in the process of strengthening their role in ensuring the quality of assessment and are committed to formalizing the assessment system. The programme in Climate Studies is on schedule to implement the new initiatives. The use of course guides makes the assessment procedures very clear and transparent, and they are very useful to the students. The committee especially values the use of the rubric for the master thesis.

The committee was impressed by the quality and assessments procedure of the theses. The high grades of the master theses are justified and reflect the high quality of the programme in general. The committee has some remarks on the theses. First, the written feedback on the assessment forms was limited or absent. According to the committee, in addition to oral feedback, written feedback is valuable to the students and it should be obligatory to provide written feedback. Second, the subject of one thesis read by the committee was not related to climate studies. Although the quality of the theses was good, the committee thinks that the programme management should be more involved in approving the thesis subject.

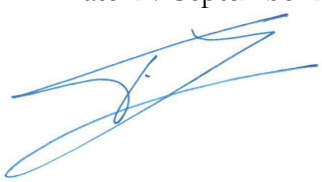
The committee is of the opinion that with the current pressure on graduating in time in the Netherlands, the large number of possible resits at Wageningen University is outdated. If students don't feel the need to pass an exam, they might not take it seriously. This is likely to lead to study delays.

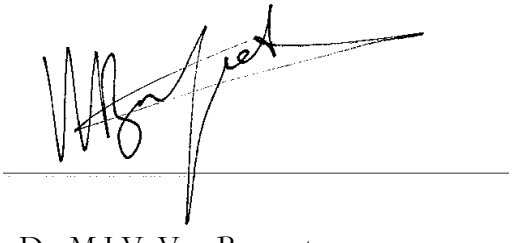
**General conclusion**
The committee assesses the standards from the Assessment Framework for Limited Programme Assessments in the following way:

| | |
|---|---|
| Standard 1: Intended learning outcomes | satisfactory |
| Standard 2: Teaching-learning environment | good |
| Standard 3: Assessment and achieved learning outcomes | good |
| | |
| General conclusion | good |

The chair and the secretary of the committee hereby declare that all members of the committee have studied this report and that they agree with the judgements laid down in the report. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 27 September 2012





Prof. F. Zwarts

Dr. M.J.V. Van Bogaert

## Description of the standards from the Assessment framework for limited programme assessments

**Standard 1: Intended learning outcomes**

The intended learning outcomes of the programme have been concretised with regard to content, level and orientation; they meet international requirements.

**Explanation**:
As for level and orientation (bachelor or master; professional or academic), the intended learning outcomes fit into the Dutch qualifications framework. In addition, they tie in with the international perspective of the requirements currently set by the professional field and the discipline with regard to the contents of the programme.

### 1.1. Findings

In this standard the committee assesses the programme's objectives and profile, intended learning outcomes, and level and orientation. Furthermore, this standard describes the requirements of the professional field and discipline.

**Programme objective and profile**

The master programme in Climate Studies was the first in the Netherlands and one of the first in Europe in the field of climate change. The Wageningen programme in Climate Studies differs from other Dutch programmes in that it combines the knowledge and expertise from three domains: Earth Sciences, Life Sciences and Social Sciences. The programme covers the geophysical and biogeochemical processes involved in climate change as well as the socio-economic aspects of causes and effects, and adaptation and mitigation as the main categories of societal response.

The critical reflection states that in the programme, students specialize, extend and deepen their knowledge and skills in the field of climate change. They can choose between a more specialized or a broader programme. The focus of the programme is on contemporary processes of land-atmosphere interactions; subjects like paleoclimatology and climate history are not treated in depth. Also, the programme is embedded in close cooperation between divergent disciplines. In the interview the programme management stated that students are trained as specialists within a specific field of climate change while at the same time they are able to collaborate with people from other disciplines and approach problems from the perspective of these other disciplines. What makes it different from other programmes in the Netherlands is the focus on social aspects.

The domain-specific framework (see Appendix 2) provides a view on the field covered by the programme. Part of it is a schematic framework from the IPCC in which four aspects of the field are highlighted: Climate Change; Impacts and Vulnerability; Socio-Economic Development; and Climate Process Drivers. As will become clear in Standard 2, the programme has 11 tracks, based on the number of chair groups that offer a thesis track. Each track covers some of the IPCC framework aspects. In the site visit it became clear that the programme does not strive to cover the entire IPCC framework with all 11 tracks.

**Intended learning outcomes**

The intended learning outcomes are provided in Appendix 3. The critical reflection provides an overview which shows that all Dublin Descriptors are reflected in the intended learning outcomes.

**Level and Orientation**
The intended learning outcomes of the programme are based on the requirements for enrolling PhD students and for academic professionals working in applied research, consultancy, and governmental and non-governmental organizations. The programme fulfils the criteria described in the Dublin Descriptors for master programmes. In this academic programme, research forms an essential element. Students are taught in an academic environment by working on authentic tasks. Approximately 40% of the graduates goes on to start a PhD.

**Requirements of the professional field and discipline**
The domain-specific framework was discussed with the External Advisory Committee (EAC) and adapted to incorporate its views. The framework is based on the position that programmes in the field of climate change should include a variety of perspectives and approaches. The EAC was also invited to comment on the intended learning outcomes. In general, the EAC agreed with the intended learning outcomes but would welcome more explicit attention being paid to dealing with uncertainties and risk communication. In the interview the programme management declared that many courses incorporate these issues, but they could be better described in the intended learning outcomes.

**1.2. Considerations**
The committee was impressed by the domain-specific framework. It clearly describes the field covered by the programme. The schematic framework from the IPCC is considered an excellent starting point. However, from the profile of the programme described in the critical reflection, it is not clear where the programme positions itself in that schematic framework. The interviews revealed that the programme does not aim to cover all four aspects of the schematic framework in each track; rather, each track covers part of the schematic framework in depth. The committee advises the programme to place all tracks in this schematic framework, making the position of the programme in the field visible. This could be a starting point for formulating an objective for the entire programme.

From the information the committee received, it was unclear whether the programme chooses for specialization or multidisciplinarity. It seems that the programme aims for a combination of the two. If so, this should be clearly stated in the programme objectives.

The intended learning outcomes are very general, though satisfactory. The committee noticed that there are no differences in the intended learning outcomes of the 11 tracks, making it difficult to differentiate between the tracks. Only implicitly, based on the courses provided, could the committee analyse the profile of each track. The committee advises developing track-specific objectives and intended learning outcomes to clearly differentiate between the tracks as well as to highlight the common aspects between them.

According to the committee, the level and orientation of the programme's objectives are without doubt at academic master level.

The committee considers that the programme is ambitious, aiming at high quality and aware of the wishes of the professional field. Each track is developed by a different chair group, resulting in differences between them. As a result, the coherence of the entire programme is not yet optimal, as is further explained under standard 2. According to the committee, the programme management has clear ideas and opinions with regard to the programme. However, the positioning of the profile of the entire programme could be stronger as well as the elaboration of the 11 tracks in the objectives and profile. The committee therefore advises

the programme management to take time to formulate objectives that will also provide external stakeholders with a clear view, like prospective students and employers of graduates.

### 1.3. Conclusion

*Master programme in Climate Studies:* the committee assesses Standard 1 as **satisfactory**.

**Standard 2: Teaching-learning environment**

The curriculum, staff and programme-specific services and facilities enable the incoming students to achieve the intended learning outcomes.

**Explanation**:
The contents and structure of the curriculum enable the students admitted to achieve the intended learning outcomes. The quality of the staff and of the programme-specific services and facilities is essential to that end. Curriculum, staff, services and facilities constitute a coherent teaching-learning environment for the students.

## 2.1. Findings

### Curriculum and coherency of the programme

The academic year of Wageningen University consists of two semesters, each with 3 periods. In periods 1, 2 and 5 (six weeks each) two courses are taught, one in the morning and one in the afternoon. Periods 3 and 4 are short periods with 4 weeks of teaching and only one course each. Period 6 lasts nine weeks. Each year students can take one exam and two resits for each course. Currently, this system is being reviewed, concerning the number of resits and the timing of the exams.

According to the critical reflection the programme is thesis-oriented and tailor-made. Students can choose one of the following 11 tracks:

- Crop and Weed Ecology
- Environmental Policy
- Environmental Economics and Natural Resources
- Environmental Systems Analysis
- Earth System Science
- Integrated Water Management
- Hydrology and Quantitative Water Management
- Meteorology
- Air Quality and Atmospheric Chemistry
- Nature Conservation and Plant Ecology
- Soil Biology and Biological Soil Quality

To a large degree students compose their individual programmes in consultation with the study adviser. The individual programme is aimed at producing a high-quality thesis, considering the students' knowledge base and required breadth and depth. The curriculum has four types of building blocks (see Figure 1): regular courses, Academic Master Cluster, academic internship and thesis. The courses are scheduled throughout the first year. In Appendix 4 an overview of courses in the curriculum is provided.

<table>
<tr><td>Year 1</td><td>Introductory courses</td><td colspan="2">Prescribed courses per thesis track<br>Elective courses</td><td>Academic Master Cluster</td></tr>
<tr><td>Year 2</td><td colspan="2">Internship</td><td colspan="2">Thesis</td></tr>
</table>

**Figure 1**: Schematic overview of the positioning of the curriculum building blocks

The programme starts with two introductory courses, of which one is obligatory while the other is chosen from two options. The introductory courses are followed by specialist courses of one of 11 thesis tracks. The thesis track has to satisfy the requirements of the chair group

offering the thesis. If the chair group specifies prerequisite knowledge, then this is included in the obligatory course list. Students can usually choose one or two additional courses from a list, in consultation with the study adviser. In addition, all students can choose three electives, either to broaden their scope or to deepen their specialization. The *Academic Master Cluster* (AMC) is scheduled at the end of the first year. Students may choose between the general *Academic Consultancy Training* (shared by many Wageningen master programmes) and the field-specific *Climate Change: Impact, Adaptation and Mitigation*. The AMC is supplemented by *Modular Skills Training*.

A thesis is offered by 11 chair groups, which are also responsible for the academic internships. The latter are done at external institutions on projects approved by the chair. From the interviews it became clear that the thesis and the internship can be on the same subject, but this is not encouraged. Students can choose to do both internship and thesis with the same chair group, leading to more specialization. Or they can choose to do them with two different chair groups, leading to multidisciplinarity.

In the critical reflection an overview of the relationship between the curriculum and the intended learning outcomes is provided in a matrix. The domain-specific knowledge is mainly provided by the compulsory course *Introduction to Global Change* and the restricted optional core courses of which each student has to take two, one in the field of social sciences and one in the field of natural sciences. Domain-specific skills are developed in the compulsory and restricted optional courses as well as in the AMC. The development of research skills is fostered by the AMC, thesis-linked courses and thesis research. The AMC and internship are mainly responsible for the development of group work skills. General academic skills are developed during thesis research, but also during the internship, *Modular Skills Training*, and the core courses. Besides the compulsory and restricted optional courses, students can choose additional courses that ensure they follow the best path to achieve the intended learning outcomes. Each of the 11 thesis tracks leaves room for 18 credits of electives.

In the interviews the committee extensively discussed the coherency of the programme. In total 90 credits are optional (restricted) for each student. Students claimed they appreciate the freedom in choosing specific courses. From the critical reflection and the interviews it became clear that the study adviser has a major regulatory role in the selection of courses. The study adviser and student discuss the students' wishes and possible plans. The study adviser might ask feedback from one of the chair holders prior to advising the student's request of electives. If a request deviates from the standard, the study adviser will assess the programme for coherency, and the Examining Board has to approve it explicitly. In the recent past the study adviser did not function according to the requirements of students and programme management. He was replaced, and the students claim that the new study adviser is helpful.

**Multidisciplinarity**

Wageningen University aims to offer programmes with a multidisciplinary and holistic approach. This is meant to stimulate students to develop a broad view and a wide range of interests. Most of the courses are attended by students from different programmes, creating a setting that favours multidisciplinary education. This could also lead to a possible friction between breadth and depth. The committee assessed whether students receive a multidisciplinary programme with sufficient depth, making them experts in a specific discipline.

The master programme in Climate Studies aims at specialized graduates with multidisciplinary expertise and a similar attitude. This starts with combining three domains: Earth Sciences,

Life Sciences and Social Sciences. Many courses are also followed by students from other tracks and/or programmes, each bringing in his/her background and perspective. By doing group work together, students develop a multidisciplinary attitude. In the interview students found it difficult to define the multidisciplinarity of the programme. They specialize by choosing courses that are followed by students from different programmes. This results in an integration of disciplines, especially when doing group work. Students also stated that it is challenging and sometimes frustrating to continuously work with students from different disciplines; they would appreciate the core courses being less focussed on multidisciplinarity. At the same time they would like an additional course, like the AMC, at an earlier stage in the programme.

Staff members informed the committee that in many courses, although predominantly focussing on a specific subject, integration with other subjects and disciplines indeed takes place. The AMC is considered crucial in the integration of disciplines and stimulates students to become multidisciplinary thinkers. The staff agrees with the programme management on the importance of the multidisciplinary approach, while the students stressed that specialization is required as well. Without specialization the programme would deliver only generalists, while prospective employers prefer to have specialists with multidisciplinary features.

**Teaching methods**

Wageningen University strives to train its students to become academics with domain knowledge, a multidisciplinary attitude, interested in problem-solving, and an international orientation with a multicultural attitude. The programmes therefore work with small, diverse student groups to stimulate the interaction between students and lecturers. A variety of didactic and learning methods are offered, including lectures, tutorials, group work, practical training, excursion and individual papers. According to the critical reflection, the teaching methods prepare graduates to work in multidisciplinary teams as well as individually, and often in a global context.

According to the critical reflection a blend of different methods is used to teach the courses. Approximately one-third of the contact time is dedicated to lectures, approximately 20% to practical training and another third to tutorials. Other teaching methods include group work, individual papers, field trips, field training and independent study. The programme feels that all students should gain experience in data analysis and model computations and preferably also in data acquisition in the field. Usually, the course coordinator decides on the teaching methods, though the programme committee might make explicit choices, e.g. to include writing an individual paper in the compulsory course *Introduction to global change*.

During the site visit the attention paid to writing skills was discussed. The writing of papers is limited in the programme. The programme management acknowledges this, but students are expected to learn their writing skills in the bachelor programme. Furthermore, there is little time in the programme to include more papers, and students have to write a master thesis.

**Improvements to the curriculum**

The individual programme committees are responsible for improving the curricula, although occasionally improvements are introduced for all programmes jointly. Ideas for improvement usually come from online course evaluations. Detailed results are reported to the lecturers and programme committees. Summaries of the results are published on the intranet. In addition to the course evaluations, there are master graduate evaluations, career surveys among alumni, and the Education Monitor.

The programme committees regularly discuss the outcomes of the evaluations and take action when considered necessary. In addition to the online evaluations, many programmes hold panel meetings with students to obtain oral feedback on the courses and the programmes. Since many of the programmes are small and the attitude between students and lecturers is informal, many issues are often dealt with informally rather than in a formal procedure.

**Staff**
Wageningen University staff generally teach in several programmes, making it difficult to provide exact student-staff ratios. The estimated student-staff ratio of the master programme in Climate Studies is 4.1.

Staff members are required to be both an expert in their discipline and a skilful lecturer. This combination allows them to make use of new scientific insights in their teaching. Most lecturers hold a PhD degree. The critical reflection provides an overview of staff members involved in the programme. A total of 67 professors are involved, 65 of whom have a PhD. In the interview staff members indicated that there are no meetings organized for all staff members involved in the programme in Climate Studies. They do meet, however, within their own chair group.

Wageningen University introduced the University Teaching Qualification (Basis Kwalificatie Onderwijs, BKO) for new permanent staff and staff on tenured track positions. Quality of teaching is evaluated after each course, which also evaluates the course content, position of the course in the curriculum, presentation and examinations. Results of these evaluations form the input for the annual performance and development interviews of staff members. Tailor-made training courses are provided by the Educational Staff Development unit for those interested, or as a result of the course evaluation.

According to the critical reflection students are satisfied with the lecturers, both regarding their subject knowledge as well as the quality of the teaching methods. In the interview students mentioned that overall they consider the lecturers to be satisfactory to good, with some even excellent. Students said they especially value that the staff is easily approachable if they have questions.

**Programme-specific services and student support**
Wageningen University has chosen to centralize all teaching facilities like lecture rooms, labs, rooms for group work and the university library on the new campus. The main education building is the Forum. The Orion education building is under construction and will add to the existing facilities in 2013. Education in the Social Sciences is concentrated in the Leeuwenborch building. Most chair groups are – or will be – located on the campus.

The Earth System Science Chair Group and the Climate Change Group have advanced measurement equipment at their disposal and a suite of simulation models at different scales. The Meteorology and Air Quality Chair Group operates a weather station for research and educational purposes. A new location (De Veenkampen) opened in April 2011. The critical reflection states that students are in general satisfied with the facilities. In the interview students claimed to be happy with the facilities on offer.

The study adviser is a member of the academic staff and attached to one of the chair groups involved in the programme. S/he provides advice concerning the study content and planning and, if necessary, mediates between students and lecturers, examiners and Examining Board. S/he monitors the study progress, allowing timely action to be taken in case of study delay. In

2011 the support from the study adviser was scored as unsatisfactory by the graduates. A study adviser who is not functioning properly might lead to problems with the quality and coherency of individual programmes. During the site visit the programme management indicated that this study adviser had been replaced. Students confirmed that adequate action was taken.

Although differences exist between programmes, all Wageningen programmes provide a lot of freedom for the individual student, making the programmes student-centred. The chair groups and their research strongly influence the courses offered, making the programmes also course-oriented. This makes the position of the study advisor crucial and demands certain qualities of him/her. The committee thinks that the study advisor should be a member of the academic staff to be able to support students in their choice for certain courses.

**Student intake, study load**

The general admission requirements of master students are published on the internet, including detailed information on admission procedures. These requirements include a relevant bachelor degree, a grade point average of 70%, fluency in English, good skills in mathematics and statistics, and fundamental computer skills. Master students are admitted following approval by the Admission Committee. In total, there are four Admission Committees, reflecting the four domains. These Admission Committees consist of the relevant Programme Directors, supported by central staff. The four Admission Committees participate in the joint Admission Policy Committee. In total, approximately 5,600 applications are handled each year.

Students with a Wageningen BSc in the following subjects have unconditional entry to the programme: Environmental Sciences, Forest and Nature Conservation, International Land and Water Management, Landscape Architecture and Planning, Soil Water Atmosphere, and Economics and Governance. Others must apply to the Admission Committee. According to the critical reflection, graduates are satisfied with the connection between the programme and their prior education.

The number of enrolling students has gradually increased since 2004 from 5 to 20 a year in 2011. The increase is partly the result of changes in the contents and name of the programme, and in the admission policy. Since 2009 the proportion of foreign students has increased to approximately 50%, which is close to the university average. The target is to enrol at least 25 students each year. In the interview the programme management indicated that it is confident that this target will be reached. This is partly due to the increased publicity as well as the general increase in climate-related issues.

In the first year of the programme, approximately 40% of the study hours are contact hours (674 hours). In the second year this is reduced to 38 hours (2.3%). In course evaluations students are asked whether they spent more or less time on a course than the nominal study load. The *Academic Consultancy Training* is the only course that is consistently deemed to require too much time. During the interview students were asked about their study load. All students spend approximately 40 hours per week on their studies. They mentioned that the study load is different for students with a natural sciences background and those with a social sciences background. The latter need more time to reach the required level of competency.

The critical reflection provides an overview of success rates, which have increased over the past five years. The number of enrolling students is low, making it difficult to assess the

results. However, with dropouts excluded, all but one students who enrolled in 2006, 2007 and 2008 graduated within three years.

### 2.2. Considerations

The committee has studied the various aspects of the teaching and learning environment of both programmes.

All Wageningen programmes provide a lot of freedom for the individual student, making the programmes student-centred. The chair groups and their research strongly influence the courses offered, making the programmes also course-oriented. This makes the position of the study adviser crucial and demands certain qualities of him/her. The committee thinks that the study adviser should be a member of the academic staff to be able to support students in their choice for certain courses.

The committee appreciates the great amount of freedom that is given to students to follow their own path. The study adviser for the master programme in Climate Studies is a member of the academic staff and is, in the opinion of the committee, very much capable of advising students in their choice of courses. Despite some minor concerns regarding the coherency of the programme as a whole, the committee is convinced that the 11 tracks are all relevant to the programme. In addition, the committee considers each track to be coherent and of high quality. In combination with the present study adviser, it is reassured that each student follows a coherent programme.

As is mentioned under Standard 1, the committee thinks that formulating the intended learning outcomes for each track will make it easier to monitor the level and coherency of the individual programmes. This will assist not only the programme director, but especially the students and the study adviser. Even with the latter being an academic staff member, s/he will not be an expert on all 11 tracks. The committee concludes that the study adviser is strongly dependent on the chair holders. In this situation it seems to work rather well, but the committee prefers that the influence of chair holders on the scope of each track is reduced, transferring control to the programme management and Examining Board.

Although all tracks are considered to be relevant, the committee wonders if the large number of tracks should be retained. This reflects the committee's opinion under Standard 1. Compressing the number of directions, without actually reducing the possibilities, might provide students with a more focussed direction, and it will be easier for students, study adviser, Examining Board and programme director to guarantee high-quality, coherent programmes.

The programme has a strong focus on multidisciplinarity, but also allows students to focus on becoming a specialist. The AMC seems crucial in the integration of different disciplines. The committee agrees with the importance of integration to obtain a multidisciplinary attitude and notes the tension between breadth and depth, also in this programme. It is exemplary that students can choose to do their internship and thesis in two different chair groups, but can also opt for doing both in one chair group. The committee noticed that thesis projects in general are related to one chair group and are subsequently monodisciplinary. It understands the friction between specialization and the multidisciplinary approach, but stimulates the programme management to look into involving multiple chair groups in a thesis project. The committee is convinced that the multidisciplinary nature of the programme could be further strengthened in this way.

The committee assessed the teaching methods used and concluded that an appropriate mix is employed. It is impressed by the combination of teaching methods in several courses, like *Climate Change* and the *Academic Consultancy Training*. The committee did notice that students do not have to write many papers and encourages the programme committee to find possibilities in the programme to better prepare students for the writing of their thesis. Students who did their bachelor degree at Wageningen University might be adequately prepared, but foreign students as well as students from other Dutch universities might need more training. Other skills are adequately incorporated into the programme, although this is not always obvious.

The critical reflection reports several examples of improvements to the curriculum, based on the course evaluations and input from the programme committee. It seems that the internal quality assurance functions adequately. The committee has the feeling that the programme is still looking for the optimal curriculum. At the same time, the programme management and programme committee seem actively involved in improving the programme when considered necessary.

The student-staff ratio is very beneficial, and a great asset to the programme. The committee feels that with the large total of 67 staff members and the fact there are no meetings for all staff involved in the programme, there is a risk of disintegration. Most Wageningen University programmes have a high number of contact hours, and this also applies to the first year of the master programme in Climate Studies. The research capabilities of the teaching staff are very good. This is, among other things, reflected in the high quality of the individual courses and the quality of the theses (see Standard 3). The teaching skills of staff members are also excellent, staff are involved in the courses they teach and are valued by the students. The facilities are good.

Despite a steady increase over the past years, the number of enrolling students remains low. This causes an imbalance between the number of enrolling students and the number of tracks offered. With an influx of 25 students per year, there are on average app. 2 students per track.

The study load is high, but acceptable. The output is good. Wageningen University has an international reputation, in terms of both high-quality research and the number of international master students. The committee especially considered the latter point since there are also potential drawbacks as well as advantages to having many international students. The number of applications from international students has increased over the past years. However, it is becoming more difficult for students who are accepted to obtain a scholarship. Nevertheless, the committee is of the opinion that the verification of quality of the international students as well as the international setting of the programme is good.

Overall, the committee is impressed by the high quality of the programme, the involvement of staff and students, and the ambition of the programme to continue improving. The considerations made above by the committee are intended to help the programme to become excellent.

### 2.3. Conclusion

*Master programme in Climate Studies:* the committee assesses Standard 2 as **good**.

**Standard 3: Assessment and achieved learning outcomes**

The programme has an adequate assessment system in place and demonstrates that the intended learning outcomes are achieved.

**Explanation**:
The level achieved is demonstrated by interim and final tests, final projects and the performance of graduates in actual practice or in post-graduate programmes. The tests and assessments are valid, reliable and transparent to the students.

## 3.1. Findings

### Assessment system

For each course the lecturers have to formulate five to eight intended learning outcomes, which are published in the Study Handbook and course guides. The course guide is obligatory for each course and explains what a course is about, how it is organized, and how students are expected to participate. Part of the course guide covers the assessment strategy, for which requirements have recently been introduced. The assessment strategy clarifies how and when a learning outcome is assessed, who is involved in assessing students, and how the final mark will be determined. It also shows the transparency and validity of the assessment. To enhance the reliability of the assessment, examiners need to explain which elements in the student's answers lead to a certain mark. For multiple choice questions this is embodied in the answer key, and for open answer questions this is shown by model answers, assessment criteria or rubrics (for an example, see Appendix 9). The previous practice was similar to the new theory, but had a less formalized manner. Currently, all Wageningen programmes are in the transition phase from the previous practice to the new situation.

With the changes in the Higher Education and Research Act, the position of the Examining Boards has changed. They are currently in the process of strengthening their role in assuring the quality assessment, both via interim course exams and the evaluation of internships and theses. The new role of the Examining Boards has two elements. The first is that each examiner will be made explicitly responsible for ensuring that an assessment of a course is valid, reliable and transparent. This was made a regular part of the University Teaching Qualification. Wageningen University produced documents to help examiners and lecturers achieve this, and meetings between the Examining Boards and examiners were held in the spring of 2011. The second element is that the Examining Boards will visit chair groups on a regular basis to verify the quality of assessment of courses provided by the groups. Additional visits will take place when required, for example when indicated by the results of course evaluations.

The learning outcomes of the individual courses form the basis with respect to the content and determination of the assessment. They cover the learning outcomes of the entire programme. Therefore, covering the learning outcomes of the courses in the assessment ensures that all the programme's objectives are covered. A distinction in assessments can be made between the regular coursework, AMC, thesis, and academic internship. The Study Handbook summarizes the different procedures, and the details for each course can be found in the assessment strategy section of each course guide. The most common forms of assessment are combinations of written examinations with open questions, assessments of individual papers, group papers or other submitted assignments, and assessments of performance during practical training.

In the critical reflection an example of an assessment is given for the Academic Consultancy Training course. This has an extensive format, including a rubric, used to assess each student's individual contribution to the end product and the collaborative process. Another example is given for the internship. An external (local) and an internal Wageningen University supervisor are appointed. They agree on the internship's learning outcomes prior to the start of the internship.

In the interview students said they are well aware of what is expected of them during a course and what the examination will look like. Each course has clear learning outcomes and an assessment strategy. Most courses have both a written examination in combination with group work, a report and/or a presentation. Students consider the examinations to be representative of the courses.

The committee learned during the site visit that students can do many resits for each course if they don't pass the first time. Each year three exam possibilities are offered for each course, and students can retake the exam as often as needed to pass.

**Quality and assessment of the thesis work**

For master programmes, the thesis, internship and Academic Master Cluster (AMC) form important parts of the programme. There is an extensive assessment format for the AMC to evaluate each student's individual contribution to the final product and collaborative process. It aims at securing grading reliability across the large number of teams participating each year. For the internship an assessment form is used which is common to all programmes. An external and an internal supervisor are appointed for the internship: the external supervisor advises on the quality of the student's performance, the internal supervisor grades the internship. For the thesis a university-wide assessment form has been designed, with which research competences, quality of the thesis report, the colloquium and the final oral examination are assessed. Recently, a rubric was developed for each component of the assessment form to describe the relation between the level of performance and the grades. The rubric can be found in Appendix 9.

The evaluation of the thesis work is done by an assessment form. Research competence and the thesis report constitute 90% of the final grade. The other 10% reflects the colloquium and examination. Recently, a rubric was developed to describe the relation between the performance and grade. Thesis work is always assessed by two assessors, one of them not personally involved in the student's supervision.

Prior to the site visit, the committee members received a total of 15 recent theses and corresponding assessments, selected from a list in the critical reflection of all theses that were completed during the last three years. This selection was done by the secretary on behalf of the chairman. When selecting the theses, grading (the same number of high, middle and low scores), graduation date and supervising chair group were considered. Student numbers of the selected theses are provided in Appendix 7.

**Success rates and performance of graduates**

The critical reflection provides an overview of success rates, which have increased over the past five years (see Appendix 5). The number of enrolling students has in recent years increased to 15-20 students each year.

### 3.2. Considerations

The committee is very positive with regard to the initiatives Wageningen University is currently implementing in the bachelor and master programmes. The Examining Boards are in the process of strengthening their role in ensuring the quality of assessment and are committed to formalizing the assessment system. The committee agrees that having only four Examining Boards is stimulating the consistency and equality of the procedures. However, these four Examining Boards are responsible for a total of 49 programmes. The committee was worried that the limited number of Examining Boards could lead to a certain distance from the programmes, making it difficult for them to really be in control at the programme level. During the two meetings with representatives of the Examining Boards and their secretaries it became clear to the committee that they are in control. The secretaries of the four committees have a key role in the communication between programme management and Examining Board.

The programme is on schedule to implement the new initiatives. The use of course guides makes the assessment procedures very clear and transparent, and they are very useful to the students. The committee especially values the use of the rubric for the master thesis.

The assessment strategies of the different courses are good, and there is sufficient variation in the examination methods. The assessment strategies of the courses are currently being combined into one at the programme level. In the thesis projects it is noticeable that the chair groups function rather independently of each other. The thesis subjects vary, as do their design and assessment. This could be solved by appointing a thesis coordinator. Once an assessment strategy at the programme level is in place, the programme committee and programme director will have a tool to control the thesis assessment.

The committee was rather impressed with the quality and the assessments of the theses. It appears that the use of the rubric is having a positive effect on the verification of the grades. The committee thinks that the high grades of the master theses are justified and reflect the high quality in general. The committee was surprised to learn that the presentation of the thesis project amounted to only 5% of the total score, although it is an important intended learning outcome.

The committee would like to make three remarks regarding the theses. First, although the assessment form is a nice tool, the written feedback on the assessment form was limited or absent for most theses. The committee learned that students receive oral feedback after the examination, but it feels that written feedback is a valuable addition. Not only the student benefits from it, others such as the Examining Board gain insight into the motivation for the grades. Second, despite the high quality of the theses, the committee noticed differences in their design. Some had a very limited description of the methods used, others were rather extensive. Especially noticeable was that the design of theses on a social sciences subject was very different compared to some of the natural sciences theses. The committee realizes that some differences will always remain due to the different publication strategies that exist in these two disciplines, but would appreciate it if all theses represented the programme. Finally, two of the theses had a subject which was not directly related to climate studies according to the committee. Although these theses were of good quality, this situation should be prevented. This is not unique to this programme since no Wageningen programme can guarantee that the thesis subjects are in line with the programme objectives.

The committee is of the opinion that with the current pressure on graduating in time in the Netherlands, the large number of possible resits at Wageningen University is outdated. If students don't feel the need to pass an exam, they might not take it seriously. This is likely to lead to study delays.

**Conclusion**
*Master programme in Climate Studies:* the committee assesses Standard 3 as **good**.

## General conclusion

Based on the assessments given for the three standards, the committee is of the opinion that this programme more than fulfils the requirements for a master programme. Especially the second and third standards are of high quality. Although standard 1 is satisfactory, the committee would recommend developing the programme objective further and differentiating among the intended learning outcomes of the individual tracks.

**Conclusion**
The committee assesses the *master programme in Climate Studies* as **good**.

# APPENDICES

## Appendix 1: Curricula Vitae of the members of the assessment committee

**Prof. Frans Zwarts** was Rector Magnificus of the University of Groningen between 2002 and 2011. He studied linguistics at the University of Amsterdam (1967-1973) and at the Massachusetts Institute of Technology (1974), and wrote a doctoral dissertation on Categorial Grammar and Algebraic Semantics (cum laude). He was appointed lecturer at the University of Groningen in 1975 and became Professor of Linguistics in 1987. He was the initiator of the European Summer School in Logic, Language and Information (ESSLLI) in 1989. In 1992, Zwarts was a visiting scholar at UCLA (University of California, Los Angeles). Between 1995 and 2002, he was chair of the Netherlands Steering Committee for Research on Developmental Dyslexia, initiated by the NWO as part of a multidisciplinary national research programme. In 1999, he became academic director of the Graduate School of Behavioural and Cognitive Neurosciences of the University of Groningen. In 2003, he and the Rector Magnificus of Uppsala University established a close partnership between Groningen and Uppsala. This was extended in 2006, when the Universities of Ghent, Göttingen, Groningen, and Uppsala decided to form the U4. In 2011 he was appointed professor and manager to realise the University Campus Fryslân. Zwarts was a member on several NQA assessment committees. He has been a Fellow of the Royal Netherlands Academy of Arts and Sciences (KNAW) since 1999.

**Mrs Renate Prenen, MSc** is educational advisor and independent entrepreneur in educational advice. She studied Applied Educational Sciences at Twente University. She worked at Randstad employment agency as advisor and programme manager. Later, she worked at the Academic Medical Centre (AMC) of the University of Amsterdam, where she was educational advisor for the Board of the AMC. In September 2009 she started as an independent educational advisor. She has been a committee member on other QANU assessment committees.

**Prof. Peter Driessen** graduated in urban and regional planning from Nijmegen University. In his PhD thesis (1990) he assessed the role of the environment, nature, and landscape in the policy for land development and land use. Currently, he is Professor of Environmental Studies at Utrecht University, Department of Innovation and Environmental Sciences. Most of his research is related to the analysis and evaluation of environmental policy and planning at the international, national and regional level. He is especially engaged in research on environmental governance. Processes of environmental governance take place at multiple levels and among multiple actors. The main aim of his research is to contribute to the search for adequate modes of governance that are aimed at environmental sustainability. By reflecting on particular practices, insights are gained into the conditions under which various modes of environmental governance are successful or unsuccessful. His research covers practices like environmental planning, spatial planning, water management, infrastructure policy, climate policy and environmental impact assessment. His other interests include interactive policy-making, policy analysis, policy evaluation, and science-policy interactions.

**Prof. Ivan Janssens s**tudied Analytical Chemistry (professional Bachelor; 1985-1987), Environmental Sciences (1989-1991), and lastly Biology (Bachelor + Master; 1991-1995; both with the highest distinction). He subsequently obtained a highly competitive PhD fellowship from the Flemish Fund for Scientific Research (FWO) and obtained his PhD degree with a thesis on soil $CO_2$ fluxes (University of Antwerp (UA); 1999; with the highest distinction). In 1999 and 2002 Janssens obtained two post-doctoral fellowships from FWO. During this period he spent one full year at the Australian National University (Canberra, Australia, research group of Prof. Farquhar), and three extended periods (3-6 months) at the University

of Tuscia (Viterbo, Italy, research groups of Prof. Scarascia-Mugnozza and Prof. Valentini). Since October 2003, he has filled a tenured staff position at the UA. Janssens was recently promoted to full professor, with a reduced teaching load of 60 hours per year. His main research focus is the carbon cycle at various spatial scales and its interactions with climate (change) and with other biogeochemical cycles (mainly water and nitrogen). Janssens is involved in teaching 5 courses: Earth Sciences; Ecological modelling; Scientific writing in English; Ecosystem types; Meteorology, climate and climate change.

**Mrs Kristine Bak Nielsen** is a student of the master programme in Geography and Mathematics at Roskilde University, Denmark. She expects to graduate in 2012. Previously, she did her bachelor programme at the same university in Geography and Mathematics. Bak Nielsen is member of the Evaluation Panel 2010-2011 of the European University Association and participated in evaluations of Politechnico di Torino, Italy, and the University of Suceava, Romania. She was also member of the Accreditation Panel that assessed the BSc and MSc programmes in Economics and Philosophy at the Copenhagen Business School in Denmark.

## Appendix 2: Domain-specific framework of reference

*Over the last four decades, climate change has emerged as one of the key challenges facing humanity. Among all sustainability problems, climate change stands out because of its wide-ranging impact on the biophysical systems of the Earth, as well as its pervasive implications for the organization of society. This domain-specific framework first outlines biophysical and societal characteristics of climate change, and then gives an indication of the appeals made by the climate change challenge to natural and social scientific research.*

Climate, the statistical description in terms of mean and variability of quantities characterizing the state of the atmosphere over an area over an extended period of time (usually 30 years), has long been considered as practically invariant. Although it had been known since the 19th century that the Earth has gone through cycles of glacial and interglacial periods, climate used to be commonly regarded as one of the permanent characteristics of an area. Climatologists described and classified climates and studied their spatial distribution, which they explained from latitude and solar radiation, global atmospheric circulation, the distribution of land and water, warm or cold ocean currents, topography, etc. Regional knowledge of the climate, including the probability of extreme weather events, found application in agriculture, construction and civil engineering. Past statistics were used as reliable guides to the future. In the second half of the 20th century, it has become clear that the climate is much more dynamic than previously thought.

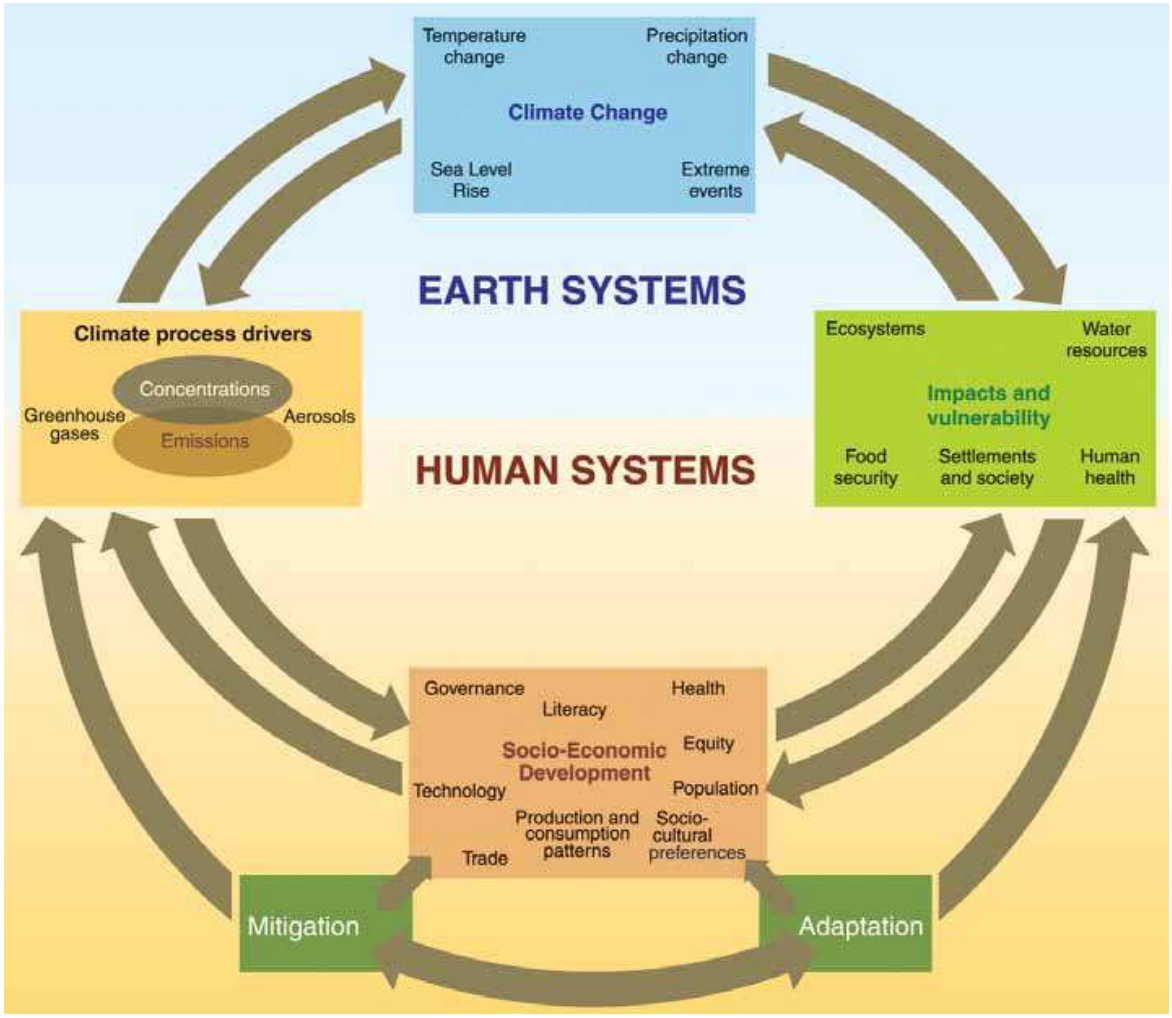



Figure A.1 Schematic framework representing anthropogenic drivers, impacts of and responses to climate change, and their linkages (IPCC, 2007).

Evidence from mountain glaciers and from historical records led to the identification of a little ice age (in the Netherlands dated between 1430 and 1860 AD). Although considered as only a modest cooling of the northern hemisphere of less than 1°C relative to late 20th century levels, the little ice age may serve to illustrate the vulnerability of natural and social systems to climate change. Likewise, paleoclimatological research aimed at explaining the genuine ice ages challenged the view of the climate being a stable system, self-regulated by natural feedback. Small variations in summer sunlight related to the Milankovitch cycles could only trigger transitions between glacial and interglacial periods because they were amplified by powerful positive feedback mechanisms involving $CO_2$ and other greenhouse gases. During the same period, evidence accumulated that emissions resulting from human activities were substantially increasing the atmospheric concentrations of $CO_2$ and other greenhouse gases (notably $CH_4$ and $N_2O$) to levels that are much higher than at any time during the last 650,000 years. Fossil fuel burning and, to a smaller extent, changes in land use (particularly deforestation) are the main anthropogenic sources of $CO_2$; agriculture is the main anthropogenic source of $CH_4$ and $N_2O$. The global temperature resumed an increasing trend, first noticed between 1920 and 1940, but absent between 1940 and 1980. The link between these phenomena has been fiercely debated, but the Fourth Assessment Report compiled by the United Nations Intergovernmental Panel on Climate Change noted that "increases in anthropogenic greenhouse gas concentrations are very likely to have caused most of the increases in global average temperatures since the mid-20th century."

The notion that climate is not robust but dynamic and subject to human influence is now directing research programmes, as well as the contents of academic curricula preparing students for positions in research or other institutions that deal with climate change and its consequences. Changes in global temperature are expected to have wide-ranging implications for ecosystems and biodiversity, water resources, agriculture and food security, coastal zones, human health, and tourism. Global warming is expected to increase the frequency and intensity of several natural hazards (floods and landslides, droughts, heat waves, and wildfires), which are likely to hit hardest in poor and vulnerable communities and which may lead to societal stress and conflicts (cf. Figure I). Studies of the socio-political (e.g. Giddens, 2011) and economic (*e.g.* Stern, 2006) aspects of climate change indicate that it is possible for societies to cope with climate change by mitigating global warming and by adapting to its consequences. Doing so successfully, however, requires huge cooperative efforts of societies worldwide. This text does not provide the space to elaborate on the socio-political and economic complexities of climate policy. By way of illustration, we list some characteristics of climate change as a social challenge:

(1) climate change is a truly global problem in that greenhouse gas emissions from any place on the globe potentially add to climate impacts in any other place;
(2) there are wide disparities between the actors causing climate problems and the actors suffering from them (persons, organizations, countries);
(3) mitigating climate change has pervasive consequences for vital sectors of modern economies, including energy, transport, and food production; this implies that effective efforts to mitigate climate change put high demands on public support for governmental policy and personal lifestyle changes;
(4) vulnerabilities to climate impacts often coincide with problems of socio-economic development; as a consequence, effective adaptation is closely related to the success of rural development and poverty alleviation.

Addressing climate change and its consequences thus requires a combination of natural science and social science to identify effective mitigation and adaptation measures and to

establish climate policies on regional, national and global levels. Mitigation efforts to reduce greenhouse gas emissions require fundamental changes in the production and use of energy and in agricultural practices. Societies have adapted to climate change in the past by *e.g.* migration, flood protection, and changes in agriculture, but their adaptive capacity depends on their social and economic development. Costs and benefits of different coping strategies need to be assessed. Policies need to be developed that can effectively engage industries, finance, citizen-consumers and NGOs in climate change measures.

Understanding of the climate system and its feedback loops is still incomplete and thus still subject to large uncertainties. The factors affecting the variability and dynamics of the climate system and their mutual interactions therefore require further research, *e.g.* on the interactions between atmosphere and land, oceans, and ice. The sensitivity of the climate to changes in these factors and the size and probability of effects like sea-level rise, extreme weather events, flooding and droughts largely remain to be quantified. Climate models have to be further developed, specified and calibrated so as to allow the construction of reliable and accurate climate scenarios. There is a need for regional predictions based on downscaling of global climate models combined with regional observations.

To be able to respond to the impacts of climate change on landscapes and ecosystems, in-depth knowledge is needed of the ecological and physiological effects of increasing $CO_2$ concentrations, the resilience of (agro-)ecosystems, taking account of species competition and migrations, soil and nutrients. Climate and water are closely linked. This not only concerns changes in ocean currents and sea-level rise, but also the effects of climate change on rainfall patterns, the duration of droughts, the melting of snow, glaciers and ice caps, the dynamics of rivers, groundwater and vegetation. Human intervention to compensate for these effects, such as building irrigation systems and coastal defence, is extremely costly and only effective if it can be substantiated by the results of research into the nature and extent of the expected effects of climate change.

Impact assessments are needed across a range of scenarios and assumptions in order to enable the assessment of risk, particularly in regions primarily comprised of developing countries and small island states, where resources for research and assessment have been inadequate to date. Options for adaptation need to be systematically explored, including the need for the development of new technologies and opportunities for adapting existing technologies in new settings. Integrated assessments across sectors, from climate change to economic or other costs, across countries and regions, including adaptations, and including other socio-economic changes have to identify meaningful options to mitigate climate change.

Master degree programmes in the field of climate change combine different disciplines that address the causes and mechanisms of climate change and the strategies of coping with it through adaptation and mitigation. Graduates must understand both climate science and the socio-economic, institutional and ethical dimensions of climate change mitigation and adaptation. Students are trained in research into aspects of climate change and its consequences. They learn how to analyse climate-change related issues, but also how to design coping strategies. Departing from their understanding of the climate system, they can visualize alternative futures and design transitions, thus enabling society to make informed decisions about the ways to deal with climate change.

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## Appendix 3: Intended learning outcomes

| **Intended Learning Outcomes**<br>**After successful completion of this programme graduates are expected to be able to:** | |
|---|---|
| 1 | explain the scientific concepts of the Earth's climate system and its regulating mechanisms, and classify the major processes that result in global change |
| 2 | explain the social-scientific concepts that are relevant to understanding the interactions between climate and society |
| 3 | distinguish between natural and anthropogenic driving forces and their effects on biogeochemical cycles and the climate system |
| 4 | apply the basic techniques of studying global change and climate variability such as statistics and modelling tools |
| 5 | use various methodological approaches to studying climate-related physical, sociopolitical and economic issues, including the prospects of mitigation of and adaptation to climate change |
| 6 | independently design and execute research plans in accordance with academic standards, thus contributing to the development of the body of knowledge in the field |
| 7 | cooperate within a multidisciplinary team by contributing to the design and development of policy measures dealing with climate change and its effects on society |
| 8 | integrate scientific information and research results, and convincingly communicate the results to specialist and non-specialist audiences, both verbally and in writing |
| 9 | critically reflect on opinions on the causes and effects of climate change, and the validity of arguments brought forward |
| 10 | appreciate the widely divergent economic and cultural situations in which people live in different parts of the world, and the effects that climate change and mitigating or adaptive measures may have on their well-being |
| 11 | reflect on the ethical aspects of their research and their recommendations of measures and interventions |
| 12 | design and plan their own learning processes by virtue of continuous reflection on personal knowledge, skills, attitudes and performance |

# Appendix 4: Overview of the curriculum

**Common part**
ESA-23306 Introduction to Global Change 6 CS
YMC-60303 Modular Skills Training 3 CS
ESS-60309 Climate Change: Impact, Adaptation and Mitigation 9 RO1
YMC-60809 Academic Consultancy Training 9 RO1
CSA-70424 MSc Internship Crop and Weed Ecology 24 RO9
ENP-70424 MSc Internship Environmental Policy 24 RO9
ENR-70424 MSc Internship Environmental Economics and Natural Resources 24 RO9
ESA-70424 MSc Internship Environmental Systems Analysis 24 RO9
ESS-70424 MSc Internship Earth System Science 24 RO9
ESS-70824 MSc Internship Integrated Water Management 24 RO9
HWM-70424 MSc Internship Hydrology and Quantitative Water Management 24 RO9
MAQ-70824 MSc Internship Meteorology 24 RO9
MAQ-71324 MSc Internship Air Quality and Atmospheric Chemistry 24 RO9
NCP-70424 MSc Internship Nature Conservation and Plant Ecology 24 RO9
SOQ-70424 MSc Internship Soil Quality 24 RO9

Select 1 course from RO1. Select an internship from RO9; students with (supervised) work experience on an academic level may exchange the internship for a second thesis.

**Meteorology and Air Quality**
ENR-22806 Principles of Climate Change Economics and Policy RO2
ESS-31806 Biogeochemical Cycles RO2
MAQ-32806 Atmospheric Dynamics RO2A
MAQ-34806 Atmospheric Chemistry and Air Quality RO2A
INF-32806 Models for Environmental Systems RO2A
MAQ-21806 Meteorology and Climate RO2A
ESS-32306 Earth System Modelling RO2A
MAQ-31806 Atmospheric Modelling RO2A
ESS-34306 Field Training Land-Atmosphere Interactions RO2A
MAQ-80836 MSc Thesis Meteorology RO2B
MAQ-81336 MSc Thesis Air Quality and Atmospheric Chemistry RO2B

Choice of 2 courses from RO2A and 1 thesis from RO2B in consultation with the study adviser.

**Hydrology**
ENR-22806 Principles of Climate Change Economics and Policy RO3
ESS-31806 Biogeochemical Cycles RO3
HWM-32806 Hydrological Processes in Catchments RO3
INF-32806 Models for Environmental Systems RO3A
ESS-32306 Earth System Modelling RO3A
HWM-80436 MSc Thesis Hydrology and Quantitative Water Management RO3

Choice of 1 course from RO3A in consultation with the study adviser.

**Plant and Crop Ecology ("green track")**
ENR-22806 Principles of Climate Change Economics and Policy RO4
ESS-31806 Biogeochemical Cycles RO4
CSA-20306 Soil-Plant Relations RO4A
INF-31806 Models for Ecological Systems RO4A
HPC-21306 Crop Ecology RO4A
CSA-32306 Designing Sustainable Cropping Systems RO4A
NCP-30306 Plant, Vegetation and Systems Ecology RO4A
CSA-80436 MSc Thesis Crop and Weed Ecology RO4B
NCP-80436 MSc Thesis Nature Conservation and Plant Ecology RO4B
MAT-20306 Advanced Statistics RO4C

Choice of 2 courses from RO4A and 1 thesis from RO4B in consultation with the study adviser; RO4C needs to be chosen too if the study adviser deems it necessary.

**Earth System Science and Soil Biology**
ENR-22806 Principles of Climate Change Economics and Policy RO2
ESS-31806 Biogeochemical Cycles RO2
SOQ-32806 Biological Interactions in Soils RO5A
ESS-33806 Integrated Water Management RO5A
MAQ-21806 Meteorology and Climate RO5A
ESS-32306 Earth System Modelling RO5A
IWE-32306 Research Approaches to Land and Water Management RO5A
ENP-36306 Climate Governance RO5A
SOQ-35306 The Carbon Dilemma RO5A
ESS-34306 Field Training Land-Atmosphere Interactions RO5A
ESS-80436 MSc Thesis Earth System Science RO5B
ESS-80836 MSc Thesis Integrated Water Management RO5B
SOQ-81836 MSc Thesis Soil Biology and Biological Soil Quality RO5B

Choice of 2 courses from RO5A and 1 thesis from RO5B in consultation with the study adviser.

**Environmental Systems Analysis**
ESS-21306 Principles of Earth and Ecosystem Science RO6
ESS-31806 Biogeochemical Cycles RO6
ENP-36306 Climate Governance RO6
ESA-31806 Environmental Assessments for Pollution Management RO6A
ESA-31306 Integrated Ecosystem Assessment in Regional Management RO6A
ESA-22806 Environmental Systems Analysis: Methods and Applications RO6B
ESA-80436 MSc Thesis Environmental Systems Analysis RO6

Choice of 1 course from RO6A; RO6B should be chosen too if the study adviser deems it necessary.

**Environmental Economics**
ESS-21306 Principles of Earth and Ecosystem Science RO7
ENR-31306 Economics and Management of Natural Resources RO7
ENP-36306 Climate Governance RO7
ENR-21306 Environmental Economics for Environmental Sciences RO7A
ENP-32306 Advanced Environmental Economics and Policy RO7A
ENR-30306 Theories and Models in Environmental Economics RO7A
MAT-22306 Quantitative Research Methodology and Statistics RO7B
ENR-80436 MSc Thesis Environmental Economics and Natural Resources RO7

Choice of 1 course from RO7A; RO7B should be chosen too if the study adviser deems it necessary.

**Environmental Policy**
ESS-21306 Principles of Earth and Ecosystem Science RO8
ENP-34306 Environmental Policy: Analysis and Evaluation RO8
ENP-36306 Climate Governance RO8
ENP-31306 Sustainable Technology Development RO8A
ENP-30306 International Environmental Policy RO8A
ENP-33306 Environment and Development RO8A
MAT-22306 Quantitative Research Methodology and Statistics RO8B
ENP-80436 MSc Thesis Environmental Policy RO

Choice of 1 course from RO8A; RO8B should be chosen too if the study adviser deems it necessary

# Appendix 5: Quantitative data regarding the programme

## Data on intake, transfers and graduation

Success rates for the master programme in Climate Studies

| Cohort | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|
| Size at the outset | 15 | 5 | 5 | 6 | 6 | 8 | 16 | 16 |
| Diploma after 2 years (%) | 27 | 20 | 0 | 83 | 67 | 63 | 63 | |
| Diploma after 3 years (%) | 73 | 40 | 80 | 100 | 67 | 100 | | |
| Diploma after 4 years (%) | 87 | 80 | 100 | 100 | 83 | | | |
| Diploma after 5 years (%) | 93 | 80 | 100 | 100 | | | | |
| *Drop-outs 1 October 2011 (%)* | *7* | *20* | *0* | *0* | *17* | *0* | *0* | *0* |

## Teacher-student ratio achieved

For Wageningen University the average student/staff ratio lies between 5.5 and 12.5 for bachelor programmes, and between 5.5 and 10 for master programmes.

For the master programme in Climate Studies the student/staff ratio is 4.1.

## Average amount of face-to-face instruction per stage of the study programme

Number of programmed contact hours

| Year | Contact hours | Contact hours (% of 1680) |
|---|---|---|
| M1 | 674 | 40 |
| M2 | 38 | 2.3 |

## Appendix 6: Programme of the site visit

11.15 - 12.00 **Management (responsible for content of the programme)**
Prof. C.S.A. (Kris) van Koppen (Staff Member and Chair Programme committee)
W.J. (Wim Joost) van Hoek (Student Member and Vice Chair Programme committee)
Th.M. (Theo) Lexmond (Programme Director and Secretary Programme committee)
Prof. A.A.M. (Bert) Holtslag (Chair Holder Meteorology and Staff Member Programme committee)

12.00- 12.45 **Lunch**

12.45 - 13.30 **Students**
S.P.K. (Simon) Bowring
S.I.M. (Nila) Kamil
L.F. (Lena) Schulte-Uebbing
H.L. (Heleen) van Soest

13.30 - 14.15 **Lecturers**
Dr. L.W.A. (Bert) van Hove (Lecturer Earth System Science/ Meteorology and Air Quality)
Prof. E.C. (Ekko) van Ierland (Chair Holder Environmental Economics and Natural Resources)
Dr. B. (Bart) Kruyt (Lecturer Earth System Science)
Dr. W. (Wouter) Peters (Lecturer Air Quality and Atmospheric Chemistry)
Dr. E.J.J.(Erik) van Slobbe (Lecturer Integrated Water Management)
Dr. B.J.M. (Bas) van Vliet (Lecturer Environmental Policy)

14.15 - 14.30 **Break**

14.30 - 15.00 **Programme committee**
L. (Lingtong) Gai (Incoming student Member Programme committee)
S.L. (Sofie) de Groot (Outgoing Student Member Programme committee)
P.W. (Peter) Kuijten (Student Member Programme committee)
S. (Simona) Pedde (Incoming Student Member Programme committee)

## Programme for Kick-off meeting, 21 February: Common part of critical reflections

| | |
|---|---|
| 09.00 09.15 | **Welcome by the Rector and the Director of the EI**[1] |
| 09.15-11.00 | **Preparatory meeting of assessment panel** |
| 11.00-12.15 | **General management programmes**: |
| | P. (Paulien) Poelarends (member, Board of the EI) |
| | R.A. (Rosella) Koning (member, Board of the EI) |
| | Prof. T.W.M. (Thom) Kuyper (member, Board of the EI) |
| | Prof. L.E. (Leontine) Visser (member, Board of the EI) |
| | Prof. E.W. (Pim)Brascamp (Director of the EI) |
| | J.J. (Jan) Steen (Quality assurance and enhancement officer) |
| 12.15-12.45 | Lunch |
| 12.45-13.30 | **Study Advisers:** |
| | Dr. A.E.M. (Anja) Janssen (BSc and MSc Food Technology, Food Safety, Food Quality Management) |
| | C.M. (Neeltje) van Hulten (BSc and MSc Agriculture and Bioresource Engineering) |
| | C.Q.J.M. (Stijn) Heukels (BSc and MSc Landscape Architecture and Planning) |
| | W.T. (Willy) ten Haaf (MSc Geo-Information Science) |
| | Dr. W. (Wouter) Hazeleger (MSc Animal Sciences) [not present] |
| | R.N.M. (Gineke) Boven (BSc Management and Consumer Studies) |
| 13.30-14.30 | **Examining Boards**: |
| | Dr. P.B.M. (Paul) Berentsen (secretary, EB[2] Social Sciences) |
| | Dr. M.C.R. (Maurice) Franssen (secretary, EB Technology and Nutrition) |
| | C.P.G.M. (Lisette) de Groot (chair, EB Technology and Nutrition) |
| | Dr. D. (Dick) van der Hoek (secretary, EB Environment and Landscape) |
| | Dr. K. (Klaas) Swart (secretary, EB Life Sciences) |
| | Prof. W (Willem) Takken (chair, EB Life Sciences) |
| 14.30-14.45 | Break |
| 14.45-15.45 | **Lecturers of Programme committees:** |
| | Dr. A.J.B. (Ton) van Boxtel (Biotechnology and Bioinformatics) |
| | Dr. J. (Jan) den Ouden (Forest and Nature Conservation) |
| | Dr. K.B.M. (Karin) Peters (Leisure, Tourism and Environment) |
| | Dr. W.A.H. (Walter) Rossing (Organic Agriculture) |
| | Dr. R. (Rico) Lie (International Development Studies) |
| | Dr. W.T. (Wilma) Steegenga (Nutrition and Health) |
| 15.45-17.15 | **Meeting of assessment panel**: evaluation and first findings |
| 17.15-18.00 | **Graduates**: |
| | Francesco Cecchi, MSc (MSc International Development Studies) |
| | Prof. Charlotte de Fraiture (MSc International Land and Water Management) |
| | Dr. Dinand Ekkel (MSc Animal Sciences) |
| | Loes Mertens (MSc Organic Agriculture) |
| | M. Visser (MSc Forest and Nature Conservation) |

[1] EI = Education Institute
[2] EB = Examining Board

## Appendix 7: Theses and documents studied by the committee

Prior to the site visit, the committee studied the theses of the students with the following student numbers:

| student number |
|---|
| 830127292020 |
| 740207633100 |
| 840313452030 |
| 840213797020 |
| 831021881040 |
| 791004154070 |
| 851007071070 |
| 861205250100 |
| 860527412030 |
| 850615054120 |
| 800906009020 |
| 860521161110 |
| 870306178040 |
| 870709571030 |
| 860705636050 |
| 860223998010 |

During the site visit, the committee studied the following documents (partly as hard copies, partly via the institute's electronic learning environment):

- Reports of consultations with relevant committees / organs (programme committee and examinations committee, relevant ad-hoc committees);
- Examination tasks with associated evaluation criteria and standard (answer keys) and a representative selection of completed examinations (presentations, internship and/or research reports, portfolios, etc.) and their evaluations;
- List of required literature;
- Summary and analysis of recent evaluation results and relevant management information;
- Thesis regulations and guidelines for preparing projects;
- Internship regulations/handbooks;
- Course, staff and curriculum evaluations, student satisfaction survey(s), etc.;
- Alumni/exit questionnaires;
- Material about the student associations;
- Documentation on teaching staff satisfaction;
- Course guides.

# Appendix 8: Declarations of independence

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**DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY**

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: FRANS ZWARTS

HOME ADDRESS: PETRUS CAMPERSINGEL 253
9713 AP GRONINGEN

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN EXPERT / ~~SECRETARY~~:

LIFE SCIENCES, SEE ATTACHMENT

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

WAGENINGEN UNIVERSITY

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;

1

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nederlands - vlaamse accreditatieorganisatie

HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

CERTIFIES TO OBSERVING STRICT CONFIDENTIALITY WITH REGARD TO ALL THAT HAS COME AND WILL COME TO HIS/HER NOTICE IN CONNECTION WITH THE ASSESSMENT, INSOFAR AS SUCH CONFIDENTIALITY CAN REASONABLY BE CLAIMED BY THE PROGRAMME, THE INSTITUTION OR NVAO;

HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: Nageningen DATE: March 30, 2012

SIGNATURE:

2

Bijlage bij onafhankelijkheidsverklaring

| Visitatiebezoek | Opleiding (CROHO-nummer): | Variant: |
|---|---|---|
| A. Food Technology | B Levensmiddelentechnologie (BLT; 56973) | Voltijd |
| | M Food Safety (MFS; 60112) | Voltijd |
| | M Food Technology (MLT; 66973) | Voltijd |
| | M Food Quality Management (MQ; 60109) | Voltijd |
| B. Biotechnology en Bio-Informatics | B Biotechnologie (BBT; 56841) | Voltijd |
| | M Biotechnology (MBT; 66841) | Voltijd |
| | M Bioinformatics (MBF; 60106) | Voltijd |
| C. Agricultural and Bioresource Engineering | B Agrotechnologie (BAT; 56831) | Voltijd |
| | M Agricultural and Bioresource Engineering (MAB; 66831) | Voltijd |
| D. Forest and Nature conservation | B Bos- en Natuurbeheer (BBN; 56219) | Voltijd |
| | M Forest and Nature Conservation (MFN; 66219) | Voltijd |
| E. International Land and Water Management | B Internationaal Land- en Waterbeheer (BIL; 50100) | Voltijd |
| | M International Land and Water Management (MIL; 60104) | Voltijd |
| F. Landscape, Architecture and Planning | B Landschapsarchitectuur en ruim. Planning (BLP; 56848) | Voltijd |
| | M Landscape, Architecture and Planning (MLP; 66848) | Voltijd |
| G. Leisure, Tourism and Environment | M Leisure, Tourism and Environment (MLE; 60111) | Voltijd |
| H. Geo-Information Science | M Geo-Information Science (MGI; 60108) | Voltijd |
| I. Plant Sciences | B Planterwetenschappen (BPW; 56835) | Voltijd |
| | M Plant Sciences (MPS; 66835) | Voltijd |
| | M Organic Agriculture (MOA; 66300) | Voltijd |
| | M Plant Biotechnology (MPB; 60105) | Voltijd |
| J. Animal Sciences | B Dierwetenschappen (BDW; 56849) | Voltijd |
| | M Animal Sciences (MAS; 66849) | Voltijd |
| K. Climate Studies | M Climate Studies (MCL; 60107) | Voltijd |
| L. International Development Studies | B Internationale Ontwikkelingsstudies (BIN; 56837) | Voltijd |
| | M International Development Studies (MID; 66837) | Voltijd |
| | M Development and Rural Innovation (MDR; 60103) | Voltijd |
| M. Management, Economics and Consumer Studies | B Bedrijfs- en Consumentenwetenschappen (BBC; 56836) | Voltijd |
| | M Management, Economics and Consumer Studies (MME; 66836) | Voltijd |
| N. Nutrition and Health | B Voeding en Gezondheid (BVG; 56868) | Voltijd |
| | M Nutrition and Health (MNH; 66868) | Voltijd |

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## DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: RENATE PRENEN

HOME ADDRESS: Simon Stevinweg 21
1401 TB Bussum

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN EXPERT / ~~SECRETARY~~:

LIFE SCIENCES - SEE ATTACHMENT

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

WAGENINGEN UNIVERSITY

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;



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HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

CERTIFIES TO OBSERVING STRICT CONFIDENTIALITY WITH REGARD TO ALL THAT HAS COME AND WILL COME TO HIS/HER NOTICE IN CONNECTION WITH THE ASSESSMENT, INSOFAR AS SUCH CONFIDENTIALITY CAN REASONABLY BE CLAIMED BY THE PROGRAMME, THE INSTITUTION OR NVAO;

HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: Wageningen DATE: 29-03-'12

SIGNATURE:



Bijlage bij onafhankelijkheidsverklaring

| Visitatiebezoek | Opleiding (CROHO-nummer): | Variant: |
|---|---|---|
| A. Food Technology | B Levensmiddelentechnologie (BLT; 56973) | Voltijd |
| | M Food Safety (MFS; 60112) | Voltijd |
| | M Food Technology (MLT; 66973) | Voltijd |
| | M Food Quality Management (MQ; 60109) | Voltijd |
| B. Biotechnology en Bio-Informatics | B Biotechnologie (BBT; 56841) | Voltijd |
| | M Biotechnology (MBT; 66841) | Voltijd |
| | M Bioinformatics (MBF; 60106) | Voltijd |
| C. Agricultural and Bioresource Engineering | B Agrotechnologie (BAT; 56831) | Voltijd |
| | M Agricultural and Bioresource Engineering (MAB; 66831) | Voltijd |
| D. Forest and Nature conservation | B Bos- en Natuurbeheer (BBN; 56219) | Voltijd |
| | M Forest and Nature Conservation (MFN; 66219) | Voltijd |
| E. International Land and Water Management | B Internationaal Land- en Waterbeheer (BIL; 50100) | Voltijd |
| | M International Land and Water Management (MIL; 60104) | Voltijd |
| F. Landscape, Architecture and Planning | B Landschapsarchitectuur en ruim. Planning (BLP; 56848) | Voltijd |
| | M Landscape, Architecture and Planning (MLP; 66848) | Voltijd |
| G. Leisure, Tourism and Environment | M Leisure, Tourism and Environment (MLE; 60111) | Voltijd |
| H. Geo-Information Science | M Geo-Information Science (MGI; 60108) | Voltijd |
| I. Plant Sciences | B Plantenwetenschappen (BPW; 56835) | Voltijd |
| | M Plant Sciences (MPS; 66835) | Voltijd |
| | M Organic Agriculture (MOA; 69300) | Voltijd |
| | M Plant Biotechnology (MPB; 60106) | Voltijd |
| J. Animal Sciences | B Dierwetenschappen (BDW: 56849) | Voltijd |
| | M Animal Sciences (MAS; 66849) | Voltijd |
| K. Climate Studies | M Climate Studies (MCL; 60107) | Voltijd |
| L. International Development Studies | B Internationale Ontwikkelingsstudies (BIN; 56837) | Voltijd |
| | M International Development Studies (MID; 66837) | Voltijd |
| | M Development and Rural Innovation (MDR; 60103) | Voltijd |
| M. Management, Economics and Consumer Studies | B Bedrijfs- en Consumentenwetenschappen (BBC; 56836) | Voltijd |
| | M Management, Economics and Consumer Studies (MME; 66836) | Voltijd |
| N. Nutrition and Health | B Voeding en Gezondheid (BVG; 56868) | Voltijd |
| | M Nutrition and Health (MNH; 66868) | Voltijd |

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**DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY**

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: Prof. dr. Peter Driessen

HOME ADDRESS: Van Renesselaan 66
3703 AK Zeist

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN EXPERT / SECRETARY:

Forest and Nature Conservation BSc + MSc
Climate Studies MSc

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

Wageningen University

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;

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HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

CERTIFIES TO OBSERVING STRICT CONFIDENTIALITY WITH REGARD TO ALL THAT HAS COME AND WILL COME TO HIS/HER NOTICE IN CONNECTION WITH THE ASSESSMENT, INSOFAR AS SUCH CONFIDENTIALITY CAN REASONABLY BE CLAIMED BY THE PROGRAMME, THE INSTITUTION OR NVAO;

HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: Zeist DATE: October 13th

SIGNATURE:

2

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**DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY**

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: IVAN JANSSENS

HOME ADDRESS: – JACOBSLAAN 122
2980 ZOERSEL
BELGIË

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN EXPERT / ~~SECRETARY~~:

LIFE SCIENCES - CLIMATE STUDIES

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

WAGENINGEN UNIVERSITY

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;

1

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HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

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HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: Wageningen DATE: 10/04/2012

SIGNATURE:

2

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**DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY**

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: MEG VAN BEEMAERT

HOME ADDRESS: CATHARYNESINGEL 56
3511 GE UTRECHT

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN ~~EXPERT /~~ SECRETARY:

LIFE SCIENCES, SEE ATTACHMENT

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

WAGENINGEN UNIVERSITY

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;



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HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: UTRECHT DATE: 20/3/12

SIGNATURE:

## Appendix 9: Rubric for the assessment of a MSc-thesis

Author: Arnold F. Moene, Meteorology and Air Quality Group, Wageningen University
Version: 1.1 (December 15, 2010)


| Item | Mark for item | | | | | |
|---|---|---|---|---|---|---|
| | **2-3** | **4-5** | **6** | **7** | **8** | **9-10** |
| 1. Research competence (30-60%) * | | | | | | |
| **1.1. Commitment and perseverance** | Student is not motivated. Student escapes work and gives up regularly | Student has little motivation. Tends to be distracted easily. Has given up once or twice | Student is motivated at times, but often, sees the work as a compulsory task. Is distracted from thesis work now and then. | The student is motivated. Overcomes an occasional setback with help of the supervisor. | The student is motivated and/or overcomes an occasional setback on his own and considers the work as his "own" project. | The student is very motivated, goes at length to get the most out of the project. Takes complete control of his own project. Considers setbacks as an extra motivation. |
| **1.2. Initiative and creativity** | Student shows no initiative or new ideas at all. | Student picks up some initiatives and/or new ideas suggested by others (e.g. supervisor), but the selection is not motivated. | Student shows some initiative and/or together with the supervisor develops one or two new ideas on minor parts of the research. | Student initiates discussions on new ideas with supervisor and develops one or two own ideas on minor parts of the research. | Student has his own creative ideas on hypothesis formulation, design or data processing. | Innovative research methods and/or data-analysis methods developed. Possibly the scientific problem has been formulated by the student. |
| **1.3. Independence** | The student can only perform the project properly after repeated detailed instructions and with direct help from the supervisor. | The student needs frequent instructions and well-defined tasks from the supervisor and the supervisor needs careful checks to see if all tasks have been performed. | The supervisor is the main responsible for setting out the tasks, but the student is able to perform them mostly independently | Student selects and plans the tasks together with the supervisor and performs these tasks on his own | Student plans and performs tasks mostly independently, asks for help from the supervisor when needed. | Student plans and performs tasks independently and organizes his sources of help independently. |
| | No critical self-reflection at all. | No critical self-reflection at all. | Student is able to reflect on his functioning with the help of the supervisor only. | The student occasionally shows critical self-reflection. | Student actively performs critical self-reflection on some aspects of his functioning | Student actively performs critical self-reflection on various aspects of his own functioning and performance. |
| **1.4. Efficiency in working with data** Note: depending on the characteristics of the thesis work, not all three aspects | **Experimental work** Student is not able to setup and/or execute an experiment. | Student is able to execute detailed instructions to some extent, but errors are made often, invalidating (part of) the experiment. | Student is able to execute an experiment that has been designed by someone else (without critical assessment of sources of error and uncertainty). | Student is able to execute an experiment that has been designed by someone else. Takes sources of error and uncertainty into account in a qualitative sense. | Student is able to judge the setup of an existing experiment and to include modifications if needed. Takes into account sources of error and uncertainty quantitatively. | Student is able to setup or modify an experiment exactly tailored to answering the research questions. Quantitative consideration of sources of error and uncertainty. Execution of the experiment is flawless. |

| Item | Mark for item | | | | | |
|---|---|---|---|---|---|---|
| | **2-3** | **4-5** | **6** | **7** | **8** | **9-10** |
| (experimental work, data analysis and model development) may be relevant and some may be omitted | **Data analysis**<br>Student is lost when using data. Is not able to use a spreadsheet program or any other appropriate data-processing program. | Student is able to organize the data, but is not able to perform checks and/or simple analyses | Student is able to organize data and perform some simple checks; but the way the data are used does not clearly contribute to answering of the research questions and/or he is unable to analyze the data independently. | Student is able to organize the data, perform some basic checks and perform basic analyses that contribute to the research question | Student is able to organize the data, perform commonly used checks and perform some advanced analyses on the data | Student is able to organize the data, perform thorough checks and perform advanced and original analyses on the data. |
| | **Model development**<br>Student is not able to make any modification/addition to an existing model. | Student modifies an existing model, but errors occur and persist. No validation. | Student is able to make minor modifications (say a single formula) to an existing model. Superficial validation or no validation at all. | Student is able to make major modifications to an existing model, based on literature. Validation using some basic measures of quality. | Student is able to make major modifications to an existing model, based on literature or own analyses. Validation using appropriate statistical measures. | Student is able to develop a model from scratch, or add an important new part to an existing model. Excellent theoretical basis for modelling as well as use of advanced validation methods. |
| **1.5. Handling supervisor's comments and development of research skills** | Student does not pick up suggestions and ideas of the supervisor | The supervisor needs to act as an instructor and/or supervisor needs to suggest solutions for problems | Student incorporates some of the comments of the supervisor, but ignores others without arguments | Student incorporates most or all of the supervisor's comments. | Supervisor's comments are weighed by the student and asked for when needed. | Supervisor's comments are critically weighed by the student and asked for when needed, also from other staff members or students. |
| | Knowledge and insight of the student (in relation to the prerequisites) is insufficient and the student is not able to take appropriate action to remedy this | There is some progress in the research skills of the student, but suggestions of the supervisor are also ignored occasionally. | The student is able to adopt some skills as they are presented during supervision | The student is able to adopt skills as they are presented during supervision and develops some skills independently as well | The student is able to adopt new skills mostly independently, and asks for assistance from the supervisor if needed. | The student has knowledge and insight on a scientific level, i.e. he explores solutions on his own, increases skills and knowledge where necessary. |
| **1.6. Keeping to the time schedule** | Final version of thesis or colloquium more than 50% of the nominal period overdue without a valid reason (force majeure) | Final version of thesis or colloquium at most 50% of the nominal period overdue (without a valid reason). | Final version of thesis or colloquium at most 25% of nominal period overdue (without valid reason) | Final version of thesis or colloquium at most 10% of nominal period overdue (without valid reasons) | Final version of thesis or colloquium at most 5% of nominal period overdue (without good reasons) | Final version of thesis and colloquium finished within planned period (or overdue but with good reason). |
| | No time schedule made. | No realistic time schedule. | Mostly realistic time schedule, but no timely adjustment of time schedule. | Realistic time schedule, with some adjustments (but not enough or not all in time) in times only. | Realistic time schedule, with timely adjustments. of times only. | Realistic time schedule, with timely adjustments of both time and tasks. |

| Item | Mark for item | | | | | |
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| | **2-3** | **4-5** | **6** | **7** | **8** | **9-10** |
| 2. Thesis report (30-60%) * | | | | | | |
| **2.1. Relevance research, clearness goals, delineation research** | No link is made to existing research on the topic. No research context is described. | The context of the topic at hand is described in broad terms but there is no link between what is known and what will be researched. | The link between the thesis research and existing research does not go beyond the information provided by the supervisor. | Context of the research is defined well, with input from the student. There is a link between the context and research questions. | Context of the research is defined sharply and to-the-point. Research questions emerge directly from the described context. | Thesis research is positioned sharply in the relevant scientific field. Novelty and innovation of the research are indicated. |
| | There is no researchable research question and the delineation of the research is absent | Most research questions are unclear, or not researchable and the delineation of the research is weak | At least either the research questions or the delineation of the research are clear | The research questions and the delineation are mostly clear but could have been defined sharper at some points | The research questions are clear and researchable and the delineation is clear. | The research questions are clear and formulated to-the-point and limits of the research are well-defined. |
| **2.2. Theoretical underpinning, use of literature** | No discussion of underlying theory. | There is some discussion of underlying theory, but the description shows serious errors. | The relevant theory is used, but the description has not been tailored to the research at hand or shows occasional errors. | The relevant theory is used, and the description has been tailored partially successful to the research at hand. Few errors occur. | The relevant theory is used, it is nicely synthesized, and it is successfully tailored to the research at hand. | Clear, complete and coherent overview of relevant theory on the level of an up-to-date review paper. Exactly tailored to the research at hand. |
| | No peer-reviewed/primary scientific papers in reference list except for those already suggested by the supervisor | Only a couple of peer-reviewed papers in reference list. | Some peer-reviewed papers in reference list but also a significant body of grey literature. | Relevant peer-reviewed papers in reference list but also some grey literature or text books. Some included references less relevant. | Mostly peer-reviewed papers or specialized monographs in reference list. An occasional reference may be less relevant. | Almost exclusively peer-reviewed papers in reference list or specialized monographs (not text books). All papers included are relevant. |
| **2.3. Use of methods and data** | No description of methods and/or data. | Research is not reproducible due to insufficient information on data (collection and/or treatment) and analysis methods | Some aspects of the research regarding data-collection, data-treatment, models or the analysis methods are described insufficiently so that that particular aspect of the research is not reproducible. | Description of the data (collection, treatment) or models as well as the analysis methods used is lacking in a number of places so that at most a more or less similar research could be performed. | Description of the data (collection, treatment) or models as well as the analysis methods used is mostly complete, but exact reproduction of the research is not possible due to lack of some details. | Description of the data (collection, treatment) or models as well as the analysis methods is complete and clear so that exact reproduction of the research is possible. |
| **2.4. Critical reflection on the research performed (discussion)** | No discussion and/or reflection on the research. Discussion only touches trivial or very general points of criticism. | Only some possible weaknesses and/or weaknesses which are in reality irrelevant or non-existent have been identified. | Most weaknesses in the research are indicated, but impacts on the main results are not weighed relative to each other. | Most weaknesses in the research are indicated and impacts on the main results are weighed relative to each other. | All weaknesses in the research are indicated and weighed relative to each other. Furthermore, (better) alternatives for the methods used are indicated. | Not only all possible weaknesses in the research are indicated, but also it is indicated which weaknesses affect the conclusions most. |

| Item | Mark for item | | | | | |
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| | **2-3** | **4-5** | **6** | **7** | **8** | **9-10** |
| | No confrontation with existing literature. | Confrontation with irrelevant existing literature. | Only trivial reflection vis-a-vis existing literature. | Only most obvious conflicts and correspondences with existing literature are identified. The value of the study is described, but it is not related to existing research. | Minor and major conflicts and correspondences with literature are shown. The added value of the research relative to existing literature is identified. | Results are critically confronted with existing literature. In case of conflicts, the relative weight of own results and existing literature is assessed. The contribution of his work to the development of scientific concepts is identified. |
| **2.5. Clarity of conclusions and recommendations** | No link between research questions, results and conclusions. | Conclusions are drawn, but in many cases these are only partial answers to the research question. Conclusions merely repeat results. | Conclusions are linked to the research questions, but not all questions are addressed. Some conclusions are not substantiated by results or merely repeat results. | Most conclusions well-linked to research questions and substantiated by results. Conclusions are mostly formulated clearly but with some vagueness in wording. | Clear link between research questions and conclusions. All conclusions substantiated by results. Conclusions are formulated exact. | Clear link between research questions and conclusions. Conclusions substantiated by results. Conclusions are formulated exact and concise. Conclusions are grouped/ordered in a logical way. |
| | No recommendations given. | Recommendations are absent or trivial. | Some recommendations are given, but the link of those to the conclusions is not always clear. | Recommendations are well-linked to the conclusions. | Recommendations are to-the-point, well-linked to the conclusions and original. | Recommendations are to-the-point, well-linked to the conclusions, original and are extensive enough to serve as project description for a new thesis project. |
| **2.6. Writing skills** | Thesis is badly structured. In many cases information appears in wrong locations. Level of detail is inappropriate throughout. | Main structure incorrect in some places, and placement of material in different chapters illogical in many places. Level of detail varies widely (information missing, or irrelevant information given). | Main structure is correct, but lower level hierarchy of sections is not logical in places. Some sections have overlapping functions leading to ambiguity in placement of information. Level of detail varies widely (information missing, or irrelevant information given). | Main structure correct, but placement of material in different chapters illogical in places. Level of detail inappropriate in a number of places (irrelevant information given). | Most sections have a clear and unique function. Hierarchy of sections is mostly correct. Ordering of sections is mostly logical. All information occurs at the correct place, with few exceptions. In most places level of detail is appropriate. | Well-structured: each section has a clear and unique function. Hierarchy of sections is correct. Ordering of sections is logical. All information occurs at the correct place. Level of detail is appropriate throughout. |
| | Formulations in the text are often incorrect/inexact inhibiting a correct interpretation of the text. | Vagueness and/or inexactness in wording occur regularly and it affects the interpretation of the text. | The text is ambiguous in some places but this does not always inhibit a correct interpretation of the text. | Formulations in text are predominantly clear and exact. Thesis could have been written more concisely. | Formulations in text are clear and exact, as well as concise. | *Textual* quality of thesis (or manuscript in the form of a journal paper) is such that it could be acceptable for a pear-reviewed journal. |

| Item | Mark for item | | | | | |
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| | **2-3** | **4-5** | **6** | **7** | **8** | **9-10** |
| 3. Colloquium (5%) * | | | | | | |
| **3.1. Graphical presentation** | Presentation has no structure. | Presentation has unclear structure. | Presentation is structured, though the audience gets lost in some places. | Presentation has a clear structure with only few exceptions. | Presentation has a clear structure. Mostly a good separation between the main message and side-steps. | Presentation clearly structured, concise and to-the-point. Good separation between the main message and side-steps. |
| | Unclear lay-out. Unbalanced use of text, graphs, tables or graphics throughout. Too small font size, too many or too few slides. | Lay-out in many places insufficient: too much text and too few graphics (or graphs, tables) or vice verse. | Quality of the layout of the slides is mixed. Inappropriate use of text, tables, graphs and graphics in some places. | Lay-out is mostly clear, with unbalanced use of text, tables, graphs and graphics in few places only. | Lay-out is clear. Appropriate use of text, tables, graphs and graphics. | Lay-out is functional and clear. Clever use of graphs and graphics. |
| **3.2. Verbal presentation and defense** | Spoken in such a way that majority of audience could not follow the presentation. | Presentation is uninspired and/or monotonous and/or student reads from slides: attention of audience not captured | Quality of presentation is mixed: sometimes clear, sometimes hard to follow. | Mostly clearly spoken. Perhaps monotonous in some places. | Clearly spoken. | Relaxed and lively though concentrated presentation. Clearly spoken. |
| | Level of audience not taken into consideration at all. | Level of audience hardly taken intro consideration. | Presentation not at appropriate level of audience. | Level of presentation mostly targeted at audience. | Level of presentation well-targeted at audience. Student is able to adjust to some extent to signals from audience that certain parts are not understood. | Clear take-home message. Level well-targeted at audience. Student is able to adjust to signals from audience that certain parts are not understood. |
| | Bad timing (way too short or too long). | Timing not well kept (at most 30% deviation from planned time). | Timing not well kept (at most 20% deviation from planned time). | Timing is OK (at most 10% deviation from planned time). | Timing is OK. | Presentation finished well in time. |
| | Student is not able to answer questions. | Student is able to answer only the simplest questions | Student answers at least half of the questions appropriately. | Student is able to answer nearly all questions in an appropriate way. | Student is able to answer all questions in an appropriate way, although not to-the-point in some cases. | Student is able to give appropriate, clear and to-the-point answers to all questions. |

| Item | Mark for item | | | | | |
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| | **2-3** | **4-5** | **6** | **7** | **8** | **9-10** |
| 4. Examination (5%) * | | | | | | |
| **4.1. Defense of the thesis** | Student is not able to defend/discuss his thesis. He does not master the contents | The student has difficulty to explain the subject matter of the thesis. | Student is able to defend his thesis. He mostly masters the contents of what he wrote, but for a limited number of items he is not able to explain what he did, or why. | Student is able to defend his thesis. He masters the contents of what he wrote, but not beyond that. Is not able to place thesis in scientific or practical context. | Student is able to defend his thesis, including indications where the work could have been done better. Student is able to place thesis in either scientific or practical context. | Student is able to freely discuss the contents of the thesis and to place the thesis in the context of current scientific literature and practical contexts. |
| **4.2. Knowledge of study domain** | Student does not master the most basic knowledge (even below the starting level for the thesis). | The student does not understand all of the subject matter discussed in the thesis. | The student understands the subject matter of the thesis on a textbook level. | The student understands the subject matter of the thesis including the literature used in the thesis. | Student is well on top of subjects discussed in thesis: not only does he understand but he is also aware of current discussions in the literature related to the thesis topic. | Student is well on top of subjects discussed in thesis: not only does he understand but he is also aware of discussions in the literature beyond the topic (but related to) of the thesis. |

**Manual for use of the thesis evaluation form and the MSc-thesis assessment rubric (version 1.1) of Wageningen University**

## User instructions

- Grading the thesis work is generally done by two persons, the daily supervisor and the second reviewer/examiner. For the sake of grading uniformity, it is highly recommended by the Exam Boards that the second reviewer within a chair group is always the same person. Preferably it is the head of the group.
- The thesis evaluation form has four categories. The research competence category can only be filled in by the daily supervisor as this person has worked with the student. The Thesis report category can most objectively be filled in by the second reviewer who was not involved in the thesis process, as grading the thesis report should not be biased by positive or negative experiences with the student. The daily supervisor who has these experiences can take these into account when grading the research competence.
- Use of the comment fields on the thesis evaluation form is highly recommended. It is an extra feedback for the student.
- The assessment rubric has the form of an analytic rubric (see e.g. Andrade (2005), Reynolds *et al.* (2009), URL1, URL2). Each line discusses one **criterion** for assessment. Each column gives a **level** for the grading. Each cell contains the **descriptor** of the level for that criterion.
- The criteria in the rubric exactly follow the items presented in the Excel worksheet "Thesis evaluation Wageningen University" constructed by the Exam Boards. In a few cases the criteria in the original thesis evaluation document were split into two or more parts because the description of the criteria clearly covered different subjects.
- Since the final mark is composed of so many criteria, the scores on individual criteria should be discriminative. Not all levels are equally broad in marks. Since the final marks of theses usually range between 6 and 9, in the rubric individual levels have been established for the marks of 6, 7 and 8. When performance is at the 9-10 level, decide whether the student is on the low edge (9) or high edge (10) of this level. Descriptions at the 9-10 level tend to describe the ultimate performance (10). Hence, if a student performs well above 8, but below the description at the 9-10 level, a 9 would be the appropriate mark.
- Keep in mind that each line in the rubric should be read independently: it could be that a student scores a 2-3 on one criterion and a 9-10 on another.
- Always start at the lowest mark in the rubric, and test if the student should be awarded the next higher mark. In some cases achievements of a next lower level are not repeated at the higher level (i.e. the lower level achievements are implicit in the higher levels). Furthermore, if a level has a range of marks, choose the most appropriate one (consider the description of the level of performance as a continuum, rather than a discrete description).
- Wherever the student is indicated as 'he', one can also read 'she'.

## Remarks

- This rubric has been validated by a number of supervisors by comparing the original grade of a number of theses to the grade resulting from this rubric.
- The main intention of using a rubric is enhance homogeneity of assessments and the ability to communicate about assessments both with students and with colleagues. Furthermore, it clarifies to students the expectations of the supervisor and helps the supervisor to structure feedback during the process of thesis research.
  Although the intention is to homogenize the process of assessment, it should be noted that even with the use of a rubric some arbitrariness will remain.
- The two main categories on the thesis evaluation form (research competence and thesis report) should have an assessment of 'sufficient' (i.e. ≥ 5.5) before the total thesis work can be considered as sufficient. So, no compensation between these main categories is possible to obtain the lowest final mark of 6.0.
- Please report any positive or negative experiences with and suggestions for the rubric to arnold.moene@wur.nl.
- Author of the rubric: Arnold F. Moene (Meteorology and Air Quality Group, Wageningen University), with valuable contributions from Ellis Hofland, Edwin Peeters, Tamar Nieuwenhuizen, Maarten Holtslag, George Bier, Gerard Ros, Lijbert Brussaard, Judith Gulikers and Paul Berentsen.

## References


Andrade, H.G, 2005. Teaching With Rubrics: The Good, the Bad, and the Ugly. *College Teaching* **53**, p. 27-31.

Reynolds, J., R. Smith, C. Moskovitz and A. Sayle, 2009. BioTAP: A Systematic Approach to Teaching Scientific Writing and Evaluating Undergraduate Theses. *Bioscience* **59**, p. 896-903.

URL1: http://jonathan.mueller.faculty.noctrl.edu/toolbox/rubrics.htm (last visited November 17, 2009).

URL2: http://en.wikipedia.org/wiki/Rubric_(academic) (last visited November 17, 2009).