Environmental Sciences

Geosciences,
Utrecht University

Quality Assurance Netherlands Universities (QANU)
Catharijnesingel 56
PO Box 8035
3503 RA Utrecht
The Netherlands

Phone: +31 (0) 30 230 3100
Telefax: +31 (0) 30 230 3129
E-mail: info@qanu.nl
Internet: www.qanu.nl

Project number: Q0419

CONTENTS

This report was finalized on 25 November 2013

Report on the bachelor programme and master programme in Environmental Sciences and the bachelor programme in Environmental Studies of Utrecht University

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

Administrative data regarding the programmes

Bachelor of science programme Environmental Sciences

Name of the programme:	Milieu-natuurwetenschappen (Environmental Sciences)
CROHO number:	56988
Level of the programme:	Bachelor
Orientation of the programme:	academic
Number of credits:	180 EC
Specializations or tracks:	none
Location(s):	Utrecht
Mode(s) of study:	fulltime
Expiration of accreditation:	31-12-2014

Bachelor of science programme Environmental Studies

Name of the programme:	Milieumaatschappijwetenschappen (Environmental Studies)
CROHO number:	56839
Level of the programme:	Bachelor
Orientation of the programme:	academic
Number of credits:	180 EC
Specializations or tracks:	none
Location(s):	Utrecht
Mode(s) of study:	fulltime
Expiration of accreditation:	31-12-2014

Master of science programme Environmental Sciences

Name of the programme:	Environmental Sciences
CROHO number:	60810
Level of the programme:	master
Orientation of the programme:	academic
Number of credits:	120 EC
Specializations or tracks:	Sustainable Development with 4 tracks: - Energy and Resources - Global change and Ecosystems - Environmental Governance - International development Water Science and Management (from 2012-2013)
Location(s):	Utrecht
Mode(s) of study:	fulltime

Expiration of accreditation: 31-12-2014

The visit of the assessment committee Environmental Sciences to Utrecht University took place on 26 and 27 September 2013.

Administrative data regarding the institution

Name of the institution:	Utrecht University
Status of the institution:	publicly funded institution
Result institutional quality assurance assessment:	positive

Quantitative data regarding the programmes

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

Composition of the assessment committee

The committee that assessed the Programmes of the Utrecht University consisted of:

- Prof. W.A. Hafkamp, chair, professor in Environmental Sciences, Erasmus University Rotterdam;
- Prof. I. Janssens, research professor at the University of Antwerp, research group of Plant and Vegetation Ecology;
- Prof. A. Jamison, professor in Technology, Environment and Society, Aalborg University, Denmark;
- Prof. I. Loots, professor at the Sociology Department and the Institute of the Environment and Sustainable Development (IMDO), University of Antwerp;
- L.H.A. van der Sanden Bsc, master student in Social and Political Sciences of the Environment, Radboud University Nijmegen.

The committee was supported by Ms. E. Poort who acted as secretary.

Appendix 1 contains the curricula vitae of the members of the committee.

Working method of the assessment committee

Preparation
The assessment of the bachelor programmes and master programme of Utrecht University is part of a cluster assessment of eleven Environmental Sciences degree programmes offered by six universities. The entire cluster committee consists of eleven members. For each visit a subcommittee of five committee members was created, taking into account potential conflicts of interest, expertise and availability.

The preparatory meeting for the cluster assessment took place on 25 March 2013. During this meeting the committee members received an introduction to the assessment framework and evaluation procedures and agreed upon the general working method. Furthermore, the domain-specific requirements and the most recent developments concerning the Environmental Sciences domain were discussed. These domain-specific requirements and the current context form the starting point for the evaluation of the quality of the degree programmes.

In preparation for the assessment of the programmes, a critical reflection report was prepared by the programme management. It was sent to QANU and forwarded to the committee members, after a check by the secretary of the committee to ensure that the information provided was complete. The committee prepared for the site visit by studying the critical reflection and a selection of bachelor and master theses. The secretary of the committee selected ten theses from each programme (30 theses in total) from a list of all graduates of the last two years. The following stratification was used: ten theses with low grades (6-6.5), eleven theses with moderate grades (7-8) and nine theses with high grades (8.5-9.5). QANU asked the programme to send the theses along with their assessment forms and divided them among the committee members. Each committee member therefore assessed six theses.

When a committee member assesses a thesis as questionable or unsatisfactory, another committee member reassesses it. If more than 10% of the theses are assessed as questionable or unsatisfactory by two committee members, the selection of theses for the programme could be extended to 25. This was not the case in Utrecht.

Site visit
The committee visited the programme on 26-27 September 2013. The first day started with a preparatory meeting to prepare for the site visit. The programme of the site visit was developed by the secretary in consultation with the chair and the programme management. The committee interviewed students, teachers and alumni, the programme management and representatives of the Faculty Board, the Board of Examiners, and student and teacher members of the Programme Committee. An open office hour was scheduled and announced (but no one made use of it).

During the site visit, the committee studied additional material made available by the programme management. Appendix 7 gives a complete overview of all documents available during the site visit. The committee used the last hours of the site visit to establish the assessments of the programmes and to prepare the presentation of its preliminary findings to the representatives of the programmes.

Report
The secretary wrote a draft report based on the committee's findings. The draft report was then amended by the committee members. After approval of the draft report by the committee, it was sent to Utrecht University for a check of factual errors. The comments made by the programme were discussed by the committee. This discussion resulted in some changes in the report, and subsequently the committee approved the final report.

Frameworks and decision rules
The assessment was performed according to the NVAO (Accreditation Organization of the Netherlands and Flanders) Framework for Limited Programme Assessment (as of 20 November 2011).

In the framework, a four-point scale is prescribed. The committee used the following definitions for the assessment of the standards:

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.

Assessment rules of limited programme assessment
When standard 1 or standard 3 is assessed as 'unsatisfactory', the general assessment of a programme is 'unsatisfactory'.

The general assessment of the programme can be good when at least two standards, including standard 3, are assessed as 'good'.

The general assessment of the programme can be excellent when at least two standards, including standard 3, are assessed as 'excellent'.

In all other cases the programme is assessed as satisfactory.

Summary judgement of the committee regarding the bachelor programme Environmental Sciences

This report presents the findings and considerations of the committee that assessed the bachelor programme Environmental Sciences (Milieu-natuurwetenschappen, hereafter referred to as MNW) of Utrecht University. The assessment is based on interviews conducted with management, staff, students and graduates of the programme and on information provided in the critical reflection, selected theses, course files and additional details obtained during the site visit. During its assessment, the committee observed many positive aspects as well as ones that could be improved. Taking these aspects into consideration, the committee found that this programme fulfils the requirements set by NVAO for re-accreditation.

Standard 1: Intended learning outcomes
The committee established that the Dutch-Flemish referential framework for academic environmental education reveals that the participating institutes are well aware of current developments and relevant questions in the field of environmental sciences. The committee is convinced that the domain-specific framework offers a solid foundation for the environmental sciences.

In the light of the domain-specific reference, the MNW programme can be characterised as a multidisciplinary programme that unites the natural and social sciences. It is rooted in the natural sciences and focuses on the analytical competence required for understanding environmental problems as well as finding solutions.

The committee verified that the programme objective and the intended learning outcomes are well aligned with the Dutch-Flemish referential framework and that all Dublin descriptors are reflected in the intended learning outcomes. It appreciates the multidisciplinary approach and is convinced that the programme equips students to participate successfully in postgraduate training programmes.

Standard 2: Teaching-learning environment
The MNW programme is offered by the Faculty of Geosciences, Department of Innovation, Environmental and Energy Sciences (IEES) and is a three-year, full-time programme. It consists of 75 EC mandatory courses and 60 EC electives ('majorgebonden keuzecursussen'). The remaining 45 EC can be taken with any course offered by Utrecht University or another university. Students complete their bachelor programme with a bachelor thesis (7.5 EC). The programme is partly interwoven with the bachelor programme Environmental Studies. The committee established that every learning outcome receives attention in the curriculum and that the distribution of the learning outcomes over the curriculum is even and appropriate.

The committee is in favour of the demand-driven design of the MNW programme and appreciates the free elective part that provides room for students to specialise following their own interests. However, it also noted that the high proportion of electives detracts from the coherence of the programme. It feels that it is left up to the students to find a good balance of 'breadth and depth' and advises offering more support to students in finding their way towards a coherent, personalized curriculum.

The didactic principle of the programme is based on the philosophy that students acquire knowledge, research skills and competence best by means of a mix of teaching methods with an emphasis on self-study, teaching methods that stimulate students, and continuous

assessment. The committee established that this didactic principle is supported by the working methods used.

The committee is impressed by the highly motivated and skilled academic staff. It gained the general impression that the staff has to deal with a high workload, but realizes that this is almost inevitable for university teaching staff with an intended teaching load of 60%.

Between 2006 and 2012 the bachelor programme MNW had an intake ranging from 18 to 37 students. The committee thinks the enrolment is on the low side but not so low that the programme would not be viable, taking into account that also students of other programmes enrol in its courses.

The IEES Study Advisor provides individual study coaching for all bachelor and master students in IEES programmes. The Study Advisor plays a major role in assuring coherency in each student's individual curriculum. Although the committee appreciates the support and guidance offered, it thinks that the students need stronger guidance in choosing their electives.

The committee noted that the programme has a very active system of continuous improvement of the courses and appreciates the way the students' voices are heard.

Standard 3: Assessment and achieved learning outcomes
The committee established that the programme has a good testing system in place. It applauds the use of test matrices and grading models. The quality assurance of examinations consists of three elements: a) professionalization of the teaching staff regarding examinations; b) evaluation of the quality of examinations by the teaching staff and c) programme management-independent evaluation of examinations by the Board of Examiners.

The committee is impressed by the active attitude towards quality assurance. It highly appreciates the way the Board of Examiners implemented their new role and responsibilities resulting from the changes in the Higher Education and Research Act introduced in September 2010.

The committee read and assessed a selection of ten bachelor theses. It established that some of them were narrow in scope and didn't have a multidisciplinary approach. It understands that this is partly a consequence of the rather small study load allocated (7.5 EC). Although none of these ten theses were considered to be unsatisfactory, the committee thinks it is questionable to call them a thesis. It advises either expanding the allocated study load to at least 15 EC or use a different term for this element of the programme

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	satisfactory
Standard 3: Assessment and achieved learning outcomes	satisfactory
General conclusion	satisfactory

Summary judgement of the committee regarding the bachelor programme Environmental Studies

This report presents the findings and considerations of the committee that assessed the bachelor programme Environmental Studies (Milieumaatschappijwetenschappen hereafter referred to as MMW) of Utrecht University. The assessment is based on interviews conducted with management, staff, students and graduates of the programme and on information provided in the critical reflection, selected theses, course files and additional details obtained during the site visit. During its assessment, the committee observed many positive aspects as well as ones that could be improved. Taking these aspects into consideration, the committee found that this programme fulfils the requirements set by the NVAO for re-accreditation.

Standard 1: Intended learning outcomes
The committee established that the Dutch-Flemish referential framework for academic environmental education reveals that the participating institutes are well aware of current developments and relevant questions in the field of environmental sciences. It is convinced that the domain-specific framework offers a solid foundation for the environmental sciences.

In light of this, the MMW programme can be characterised as a multidisciplinary programme that unites the natural and social sciences. It is rooted in the social sciences and concentrates on the analytical competences required for understanding environmental problems as well as solution-focused skills.

The committee verified that the programme's intended learning outcomes are well aligned with the Dutch-Flemish referential framework and that all Dublin descriptors are reflected in them. It appreciates the multidisciplinary approach but has some concerns about the rather narrow interpretation of social sciences to policy sciences and public administration. It feels that the social sciences have more to offer, for example through (social) psychology, (cultural) sociology and history.

The committee is convinced that the programme equips students to participate successfully in postgraduate training programmes.

Standard 2: Teaching-learning environment
The MMW programme is offered by the Faculty of Geosciences, Department of Innovation, Environmental and Energy Sciences (IEES) and is a three-year, full-time programme. It consists of 75 EC mandatory courses and 60 EC electives ('majorgebonden keuzecursussen'). The remaining 45 EC can be awarded by any course offered by Utrecht University or another university. Students complete their bachelor programme with a thesis (7.5 EC). The MMW programme is partly interwoven with the bachelor programme Environmental Sciences. The committee studied the curriculum and is not totally convinced that its compulsory framework provides students with sufficient opportunities to obtain an adequate understanding of environmental issues from a natural sciences perspective.

The committee is in favour of the demand-driven design of the MMW programme and appreciates the free elective part that provides room for students to specialise following their own interests. However, it also noted that the high proportion of electives detracts from the coherence of the programme. It feels that it is left up to the students to find a good balance of 'breadth and depth' and advises offering more support to students in finding their way towards a coherent, personalized curriculum.

The didactic principle of the programme is based on the philosophy that students acquire knowledge, research skills and competences best by means of a mix of teaching methods with an emphasis on self-study, teaching methods that stimulate students, and continuous assessment. The committee established that this didactic principle is supported by the working methods used.

The committee is impressed by the highly motivated and skilled academic staff. It gained the general impression that the staff has to deal with a high workload but realizes that this is almost inevitable for university teaching staff with an intended teaching load of 60%.

Between 2006 and 2012 the bachelor programme MMW had an intake ranging from 24 to 55 students. During the two most recent academic years, around 30 students enrolled in the MMW programme. The committee thinks the enrolment is on the low side but not so low that the programme would not be viable, taking into account that also students of other programmes enrol in its courses.

The committee has concerns about the high dropout rate and the study delay. Both are considered to be a consequence of the fact that a substantial number of the enrolling students has expectations that are not met in the programme. The committee supports the implementation of matching activities to prevent the enrolment of less motivated students in this programme.

The IEES Study Advisor carries out the individual study coaching for all bachelor and master students in IEES programmes. The Study Advisor plays a major role in assuring coherency in the individual curriculum of each student. Although the committee appreciates the support and guidance offered, it thinks that the students need stronger guidance in choosing their electives.

The committee noted that the programme has a very active system of continuous improvement of the courses and appreciates the way the students' voices are heard.

Standard 3: Assessment and achieved learning outcomes

The committee established that the programme has a good testing system in place. It applauds the use of test matrices and grading models. The quality assurance of examinations consists of three elements: a) professionalization of the teaching staff regarding examinations; b) evaluation of the quality of examinations by the teaching staff and c) programme management-independent evaluation of examinations by the Board of Examiners.

The committee is impressed by the active way quality assurance is offered. It highly appreciates the way the Board of Examiners implemented their new role and responsibilities resulting from the changes in the Higher Education and Research Act introduced in September 2010.

The committee read and assessed a selection of ten bachelor theses. It established that some of the theses were narrow in scope and didn't have a multidisciplinary approach. It understands that this is partly a consequence of the rather small study load allocated (7.5 EC). Although none of these ten theses were considered to be unsatisfactory, the committee thinks it is questionable to call them a thesis. It advises either expanding the allocated study load to at least 15 EC or use a different term for this element of the programme.

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	satisfactory
Standard 3: Assessment and achieved learning outcomes	satisfactory
General conclusion	satisfactory

Summary judgement of the committee regarding the master programme Environmental Sciences

This report presents the findings and considerations of the committee that assessed the master programme Environmental Sciences (ES) of Utrecht University. The assessment is based on interviews conducted with management, staff, students and graduates of the programme and on information provided in the critical reflection, selected theses, course files and additional details obtained during the site visit. Taking all the above into consideration, the committee found that this programme fulfils the requirements set by the NVAO for re-accreditation.

Standard 1: Intended learning outcomes
The committee established that the Dutch-Flemish referential framework for academic environmental education reveals that the participating institutes are well aware of current developments and relevant questions in the field of environmental sciences. It is convinced that the domain-specific framework offers a solid foundation for the environmental sciences. It verified that the programme's intended learning outcomes are well aligned with the Dutch-Flemish referential framework and that all Dublin descriptors are reflected in them.

The master programme Environmental Sciences can be characterized as a two-year, multidisciplinary, research-oriented, scientific programme that acquaints students with both natural and social sciences. It is designed to: (a) offer an integrative overview and capabilities to collaborate beyond disciplinary boundaries; and (b) simultaneously allow students to specialise in various application fields by offering depth in mastering relevant theories and dominant research methodologies in that application field.

The committee is impressed by the way the programme's dual mission combines breadth using integrated perspectives on sustainable development with in-depth knowledge of relevant application fields.

The committee verified that the programme equips students to successfully pursue a career in research but also prepares them for other careers, such as in consultancy, government and not for profit organisations.

Standard 2: Teaching-learning environment
The programme is offered by the Faculty of Geosciences, Department of Innovation, Environmental and Energy Sciences (IEES) and is a full-time, two-year programme. The first year is predominately comprised of theoretical and methodological course modules and optional fieldwork. The first-year students follow eight course modules of 7.5 EC each. During the second year, students follow two to four courses. The remaining time is devoted to individual research-related activities that include an independent research project. These activities culminate in the writing of the master thesis.
Based on their interests, students entering the programme select one of the following specialisation programmes and application fields in the Environmental Sciences programme: Energy and Resources (ER); Global Change and Ecosystems (GCE); Environmental Governance (EG) or International Development (ID).

The committee established that the curriculum reflects the broad, multidisciplinary field of the Environmental Sciences. It approves the way the programme presents its dual mission of being broad in combination with in-depth knowledge within the four tracks.

The programme takes part in the Joint International Master in Sustainable Development (JIMiSD). In this consortium, four EU and for non-EU universities have joined forces. The committee appreciates the international orientation of the programme. However, during the site visit, it gained the impression that the opportunities in JIMiSD could be used better to benefit both students and the programme.

The didactic principle of the programme is based on the philosophy that students acquire knowledge, research skills and competences best by means of a mix of teaching methods with an emphasis on self-study, teaching methods that stimulate students, and continuous assessment. The committee established that this didactic principle is supported by the working methods used.

The committee was impressed by the highly motivated and skilled academic staff. It gained the general impression that the staff has to deal with a high workload but realizes that this is almost inevitable for university teaching staff with an intended teaching load of 60%.

Throughout the years, the number of students enrolling in the master programme ES has gradually risen to 100. The committee considers this intake healthy. It applauds the broad range of nationalities and backgrounds of the students.

The IEES Study Advisor carries out the individual study coaching for all bachelor and master students in IEES programmes. The Study Advisor plays a major role in assuring coherency in the individual curriculum of each student. Apart from the Study Advisor, the programme manager is involved in this.

The committee noted that the programme has a very active system of continuous improvement of the courses and appreciates the way the students' voices are heard.

Standard 3: Assessment and achieved learning outcomes
The committee established that the programme has a good testing system in place. It applauds the use of test matrices and grading models. The quality assurance of examinations consists of three elements: a) professionalization of the teaching staff regarding examinations; b) evaluation of the quality of examinations by the teaching staff; and c) programme management-independent evaluation of examinations by the Board of Examiners.

The committee was impressed by the very active way in which the quality assurance is offered. It greatly appreciates how the Board of Examiners has implemented its new role and responsibilities resulting from the changes in the Higher Education and Research Act introduced in September 2010.

The committee read and assessed a selection of ten master theses. It is of the opinion that the theses show that students have acquired knowledge and understanding at a level that matches a master programme and that they are able to conduct research at that level as well. It was impressed by the quality of some of the theses. In general, It agreed with the grades awarded.

The committee also studied the assessment forms attached to the theses and concluded that the written evaluation provided on the assessment form was extensive and helpful for the students.

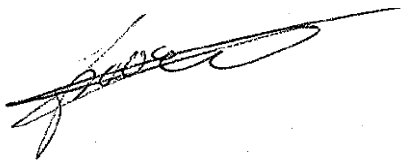
Conclusion

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	satisfactory
Standard 3: Assessment and achieved learning outcomes	good
General conclusion	satisfactory

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 it. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 25 November 2013



Wim Hafkamp

Esther Poort

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.

Findings

1.1 The domain of environmental sciences

The Environmental Sciences examine human-environment interactions and the resulting problems from an integrated and interdisciplinary perspective. Environmental scientists in the Netherlands, Flanders and abroad have proclaimed themselves to be interdisciplinary by nature. The Environmental Sciences discipline comprises the natural sciences, the social sciences, and the technical and medical sciences, and attempts to combine the myriad of perspectives within these disciplines. Nevertheless, educational programmes from different universities take up different positions in this spectrum of specializations. The domain of Environmental Sciences and initiatives towards establishing international benchmarks are described in the Dutch-Flemish referential framework for academic environmental education (Appendix 2). This framework is the result of discussions between the academic heads of the Dutch and Flemish environmental educational programmes.

The committee established that the domain-specific framework reveals that the participating institutes are well aware of current developments and relevant questions in the field of Environmental Sciences. It is convinced that the domain-specific framework offers a solid foundation for the programmes in environmental sciences.

In the light of this domain-specific reference framework, the two bachelor programmes at Utrecht University can be characterised as multidisciplinary programmes that unite the natural and social sciences. Both offer a generalist rather than a specialist programme and concentrate on the analytical competences required for understanding environmental problems as well as problem solving skills.

During the visit the programme management explained the rationale to offer two different bachelor programmes. Although they both combine the natural and the social sciences, each programme has its own specific scope. The Environmental Sciences bachelor (milieu-natuurwetenschappen hereafter referred to as MNW) is primarily rooted in the natural sciences, and the programme only accepts students that hold a science-oriented VWO certificate including disciplines like chemistry, physics and mathematics. This science background is required to follow the compulsory sciences courses within the programme. The Environmental Studies bachelor (milieumaatschappijwetenschappen, hereafter referred to as MMW) is primarily rooted in the social sciences and admits all students with a VWO certificate. The committee thinks it is questionable offering two different bachelor programmes that are highly interwoven. However, it understands this is necessary in order to

allow students' with different backgrounds to enrol in a programme that fits their prior knowledge regarding natural sciences.

The master programme Environmental Sciences can be characterized as a two-year, multidisciplinary, research-oriented, scientific programme that acquaints students with both natural and social sciences. It is designed to: a) offer an integrative overview and capabilities to collaborate beyond disciplinary boundaries; and (b) simultaneously allow students to specialise in various application fields by offering depth in mastering relevant theories and dominant research methodologies in that application field. The committee appreciates this dual mission.

The committee noted that the master programme is internationally oriented. All course modules are taught in English by experienced, international staff. About 40-50% of the students presently enrolled in the programme are from abroad, resulting in an international student community. The programme takes part in the Joint International Master in Sustainable Development, which consists of eight partner universities. The committee appreciates the international orientation of the master programme.

1.2 Programmes objectives and intended learning outcomes

The three programmes study environmental problems from the normative perspective of sustainable development, in which environmental problem-solving is conceptualised as a process of change to find a balance between ecological, technological, economic and social-cultural values on both the local and the global scale and in the short and the long term.

In the critical reflections, all three programmes explicitly related their intended learning outcomes to a) the competencies defined in the domain-specific reference and b) the Dublin descriptors. A specification of these intended learning outcomes is included in Appendix 3. For each programme, the committee verified that the intended learning outcomes are well aligned with the Dutch-Flemish referential framework and that all Dublin descriptors are reflected in them.

Bachelor programme MNW
The vision of the bachelor programme MNW is to provide students with a broad orientation to create a solid base from which to develop an in-depth understanding of environmental problems. The discipline of Environmental Sciences takes environmental problems as its object of study and investigates the causes, solutions, and translations into a sustainable policy. In this 'sustainable' approach, energy and resources (such as soil, water, atmosphere and ecosystems), along with their mutual interactions and dominant processes, play an important role. In particular, this MNW programme examines the human impact on these processes as both cause and possible solutions.

As described in the critical reflection, this vision has been translated into broad objectives:

- Achievement of basic knowledge, insight and skills in the broad domain of the Environmental Sciences. This includes understanding environmental problems (science and society oriented); understanding the relevant science disciplines; integration of multidisciplinary knowledge; and the required research skills.
- Development of general academic competencies. These competencies include: 1) thinking and acting on an academic level; 2) the ability to handle the set of instruments relevant for scientific research; 3) scientific communication; and 4) the application of specific

knowledge pertaining to the domain in a wider scientific, philosophical and societal context.
- Preparation for a further (study) career.

The committee appreciates the multidisciplinary approach and thinks that the programme is a good representation of a bachelor environmental sciences with a focus on natural sciences. The committee noted that the learning outcomes are clearly articulated.

Bachelor programme MMW
The general aim of the MMW programme encompasses learning in four domains: basic knowledge and insight into environmental problems; knowledge of the main social scientific disciplines, and their limitations, relevant for the study of environmental problems; integration of multidisciplinary knowledge; and research skills and general academic competencies.

The vision of the programme is that MMW students should understand the basic principles of environmental processes (from a natural science perspective); the interaction between societal activities and structures and environmental processes; and the main measures that mitigate or even prevent environmental problems. According to the critical reflection, MMW students know how MNW students and scientists approach and analyse environmental problems, and vice versa. Only then can MMW students and graduates effectively cooperate with MNW peers in multidisciplinary settings

While the programme integrates the natural and social sciences, it is primarily rooted in the social sciences. As described in the critical reflection, it combines concepts and theories from different social sciences.

The committee appreciates the multidisciplinary approach but has some concerns about the narrow interpretation of social sciences to policy sciences and public administration. It feels that the social sciences have more to offer, for example through (social) psychology, (cultural) sociology and history.

Master programme Environmental Sciences
The mission of the master programme ES is to educate scientists who will be able to make a substantial contribution to the transition to a sustainable society through their scientific research and their skills in the area of societal interventions.

This mission has been translated into general objectives for the overall programme that further elaborate upon the competences obtained in the bachelor phase of the academic education of the student. These overall objectives are:

- To enable integration of knowledge, which is needed to be able to analyse, describe and explain sustainability issues (in terms of cause and effect) and place these issues in their societal context.
- To apply knowledge integration in the generation, assessment and implementation of measures that make a transition to a sustainable society possible.

The committee is impressed by the way the programme's dual mission combines being broad using integrated perspectives on sustainable development with depth of relevant application fields. In the committee's opinion, there is a good balance between these two missions.

1.3 Requirements of the professional field and discipline

In order to improve the connections between the programmes and the professional field, an Advisory Board was established in 2011. It is comprised of members from private and public organisations. These Board members occupy strategic positions and have clear overviews of dominant trends in the labour market and the consequences of those trends for the labour market of academics. The committee approves the establishment of this Advisory Board.

Bachelor programmes
As described in the critical reflections, there are currently limited employment opportunities for graduates of the bachelor programme within the domain of environmental sciences or environmental studies. Both programmes therefore primarily focus on preparing students for an academic master programme. The committee understands that the possibilities on the labour market are very limited and that the programmes choose to focus on preparation for a master programme. However, it points out that a bachelor programme should be an independent programme that offers graduates more options than enrolling in a master programme.

After completing one of the bachelor programmes, students are admissible to one of the numerous master specialisations in Environmental Sciences that are on offer in the Netherlands or abroad. In Utrecht, students can choose from a broad range of master programmes, including Sustainable Development and Water Science and Management (since 2012). The committee is convinced that both bachelor programmes equip students to participate successfully in postgraduate training programmes.

Master programme Environmental Sciences
The committee agrees with the critical reflection that the master programme in Environmental Sciences has a strong academic orientation. This implies a focus on broad academic as well as disciplinary knowledge and skills. Graduates are prepared to continue as a PhD candidate in academia or as a researcher in other public or private sectors. In addition, they are also equipped for jobs involving the development and implementation of solutions regarding sustainable development issues (both in the public and private domain).

The committee verified that the programme equips students to successfully pursue other careers, such as in consultancy, government and not for profit organisations. It gained the impression that although the programme doesn't explicitly aim to develop practically oriented skills, students develop these skills during the programme. It appreciates this combination of addressing both research and practically oriented skills.

Considerations

The committee established that the programmes fit well in this described domain of Environmental Sciences. It noted and agrees that both bachelor programmes at Utrecht University integrate the natural and the social sciences perspectives, but that each programme has its own specific scope. The MNW is primarily rooted in the natural sciences, and the MMW programme is primarily rooted in the social sciences.

The committee appreciates the multidisciplinary approach of the programmes but has some concerns about the rather narrow interpretation of social sciences to policy sciences and public administration. It feels that the social sciences have more to offer, for example through (social) psychology, (cultural) sociology and history.

The master programme Environmental Sciences is a two-year, multidisciplinary, research-oriented, scientific programme that acquaints students with both natural and social sciences. The committee is impressed by the way its dual mission combines being broad using integrated perspectives on sustainable development with in-depth knowledge of relevant application fields.

For each programme, the committee verified that the intended learning outcomes are well aligned with the Dutch-Flemish referential framework and that all Dublin descriptors are reflected in them.

The committee is convinced that both bachelor programmes equip students to participate successfully in postgraduate training programmes. It verified that the master programme equips students to successfully pursue a career in the field of research but also prepares them for other kinds of jobs, like consultancy or policy development in government services.

Conclusion

Bachelor programme Environmental Sciences (MNW): the committee assesses Standard 1 as **satisfactory.**
Bachelor programme Environmental Studies (MMW): the committee assesses Standard 1 as **satisfactory.**
Master programme Environmental Sciences: 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.

Findings

2.1 Structure and cohesion of the programme

The three programmes are offered by the Faculty of Geosciences, Department of Innovation, Environmental and Energy Sciences (IEES).

Bachelor programme MNW and MMW
Both bachelor programmes are three-year, full-time programmes (180 EC). Each consists of 75 EC of mandatory courses and 60 EC of electives. The remaining 45 EC can be awarded for any course offered by Utrecht University or another university (given that the level and scope are compatible with Utrecht University's standards). Electives leave room for personal development according to the student's specific interests. Additionally, students may use those 45 EC to take courses that make up a 'minor': a specialisation in another discipline such as earth sciences and innovation studies.

Bachelor courses at Utrecht University are taught at three levels: introductory (level 1); deepening (level 2); and advanced (level 3). In general, each level corresponds to the year of study in which the course modules are taught. Parallel with these knowledge levels, academic skills are trained on three levels. Appendix 4 provides an overview of the mandatory courses and electives (majorgebonden).

The content of both bachelor programmes is organised into four main blocks:

	Bachelor MNW	**Bachelor MMW**
1.	Basic knowledge and insight into environmental problems in their societal context	Basic knowledge of and insight into environmental problems
2.	Knowledge of the main natural science disciplines and their limitations relevant for the study of environmental problems	Knowledge of the main social science disciplines and their limitations relevant for the study of environmental problems
3.	Integration of multidisciplinary knowledge from various science (beta) disciplines as well as from MNW and MMW	Integration of multidisciplinary knowledge from various MMW disciplines as well as from MMW and MNW;
4.	Research skills and general academic competences	Research skills and general academic competencies

These blocks are derived from the stated intended learning outcomes and are integrated in the programmes to ensure their achievement.

The two bachelor programmes are partly interwoven. The first-year students from both programmes follow two mandatory, multidisciplinary, introductory courses on environmental

and sustainability problems (Sustainable Development and Foundations of Environmental Sciences and Studies). The third-year students from both programmes carry out the mandatory Environmental Consultancy Project. In this project MNW and MMW students explicitly work in multidisciplinary teams in order to confront, integrate and apply disciplinary knowledge and research skills. The course centres on the specific knowledge needs of societal actors (e.g. provinces, municipalities, environmental NGOs and companies). Teams of students not only conduct research but also have to formulate advice for their 'commissioners'. According to the critical reflections, students are usually very enthusiastic about working on 'real-life' problems and contributing to solving environmental problems. This was confirmed during the interviews with MNW and MMW students.

Students from both bachelor programmes take two research skills courses. The research skills 1 course is similar for both bachelor programmes and is centred round the 'empirical cycle'. Students are also trained in basic statistics and in the main MMW and MNW research methods. In the research skills 2 course MNW students are trained in advanced statistics and GIS while MMW students are trained in advanced statistics, case study research, interview skills, data analysis and reporting. The acquired skills are applied in small or larger assignments (on an individual basis or in small groups). In the MNW curriculum, special emphasis is placed on typical environmental science research skills such as fieldwork and modelling. The general academic competencies like writing skills, oral skills and professional competencies are trained through specifically assigned courses.

Students complete their bachelor programme with a thesis in which they demonstrate their ability to individually design and conduct a research project that is limited in size. The thesis is scheduled as a regular course of 7.5 EC. In order to guarantee an adequate basis for starting this project, strict entrance requirements are set in terms of what courses should have been completed.

The committee appreciates the close cooperation of the bachelor programmes and thinks that this provides students with good opportunities to study the environmental sciences from a multidisciplinary approach.

The committee is in favour of the demand-driven design of the bachelor programmes and appreciates the free elective section and the elective minor section that provide room for students to specialise according to their own interests. However, it also noted that this model has some disadvantages.

First, during the site visit students talked about a sizeable amount of overlap between courses. This is especially the case for courses with a high inflow of students from other bachelor programmes. During the site visit the management explained that it is aware of the need to be continuously alert to avoid duplication in courses. As described in the critical reflection, there should be better definitions of what prior knowledge is necessary before entering a course. The committee strongly advises making better use of Blackboard, for example by offering an online module about the necessary prior knowledge. It also recommends looking for other ways of avoiding overlap, for example by modifying the way group work is organized (only students from the MMW/MNW programme in one group).

Second, the committee gained the impression that the high proportion of electives might detract from the coherence of the programme. It noted that this design works out well for mature students who know what they want. These students are offered sufficient possibilities to make their own choice and acquire in-depth knowledge about a specific field of their own

interest. However, the committee also noted that some students are overwhelmed by all the choices available. It gained the impression that it is left up to the students to find a good combination of breadth and depth. It advises offering more support to students in finding their way in achieving in-depth knowledge where they want it, and it recommends pre-structuring the choices available and reducing the choices in the early stages of the programme.

Third, the design of the programme makes it really difficult for students to study abroad during their bachelor programme. Students who want to study abroad need to start planning almost immediately at the start of their first year.

Besides the above-described common design and interwoven courses, the bachelor programmes each have their own specific elements and courses, as described below.

Bachelor programme MNW
In the first year of the programme, students follow two compulsory, introductory, natural science courses that are relevant for the environmental sciences. These courses build upon and extend the knowledge students acquired during secondary school. Furthermore, depending upon their interests, students follow one or two elective natural science courses.

MNW students acquire further knowledge of the societal and ethical context of environmental problems in one compulsory course and two electives with a social science emphasis.

The integrating of the disciplinary knowledge takes place in several compulsory courses (Processes in the Environmental Compartments and Global Climate Change). Most of the science courses have a thematic character and aim to integrate elements from different disciplines. The themes 'water and nature' and 'energy and resources' orient the students in these subject areas and act as vehicles to combine insights from various MNW disciplines.

Bachelor programme MMW
The MMW programme concentrates on the following disciplines:

- Policy sciences
- Spatial sciences (Human Geography and Spatial Planning)
- Innovation sciences
- Public administration
- Economics
- Law
- Sociology

In the first year of the programme, students are introduced to the basics of the primary MMW disciplines. In the second year, their knowledge is deepened further. Within these disciplines, students are familiarised with the various modes of governance, ranging from classical top-down regulation to self-governance (e.g. market self-regulation in the form of Corporate Social Responsibility).

The integration of various MMW disciplines takes place in the level 3 courses: Sustainable Land Use and Business and Sustainability and Innovation.

As mentioned under standard 1, the committee thinks that the programme focuses too strongly on a public policy point of view with regard to problem solving. During the site visit, it gained the impression that abundance on this point does not really appeal to the students. The students indicated that the programme focuses too strongly on policy and governance and that there are too many overlaps between environmental policy courses. They also stated that lecturers could choose more up-to-date cases as examples in their courses. The committee advises providing courses that appeal more to the students and especially avoiding overlap between the environmental policy courses.

Master programme Environmental Sciences
The master programme is a full-time, two-year programme (120 EC). The first year is predominately comprised of theoretical and methodological course modules and optional fieldwork. Typically, the students follow eight course modules of 7.5 EC each which are distributed equally over the two semesters (with each semester containing two periods). Two course modules run parallel per period. During the second year, students follow 2-4 courses. The remaining time is devoted to individual research-related activities that include an independent research project. These activities culminate in the writing of a thesis.

Based on their personal interest and prior education, students select one of the following specialisations and application fields when they enter the programme:

- Energy and Resources (ER). This track focuses on energy and resources as key factors in the transformation of our industrial society towards a more sustainable development pattern.
- Global Change and Ecosystems (GCE). This track provides natural science-based knowledge on the interrelations between humans, environment and ecosystems.
- Environmental Governance (EG). This track focuses on the way societal actors deal with the sustainability challenge on several levels of decision-making
- International Development (ID). This track focuses on development in the 'Global South'.

Students who wish to combine technical knowledge with management skills regarding water issues can also enrol in the new specialisation Water Science and Management, which started in 2012. In this specialisation, students become academic water professionals with knowledge of the technical aspects of water management and the ability to implement this knowledge in the light of sustainable development.

The programme applies a T-shaped structure, combining integrated perspectives on sustainable development (SD issues and future trends) with depth in relevant application fields. This structure is translated into two initial integrative courses for all students in the first semester. These courses run parallel with the first two specialising courses in the application fields. Three-quarters of the first year is devoted to specialisation in one of the application fields. In the second year, the programme also begins with an integrative common course that focuses on applying knowledge gained in the various application fields in a transdisciplinary setting (Transdisciplinary Case Study). In this way, students follow three obligatory, common, integrative courses and every separate application field 'track' offers 4-6 course modules and one or two optional courses.

During the site visit, the committee gained the impression that the Transdisciplinary Case Study is a very valuable element of the programme and offers a good opportunity for students to develop their professional skills. Students really appreciate this opportunity to

come together with students from different tracks and to apply their knowledge and skills jointly in the 'real world'.

Internships are possible as an individual research project (7.5-15 EC) in the second year and as a component of the master thesis. In both cases, internships are approached as research projects. The Individual Research Project has a limited scope and consists of a literature review and working with already available data. On the other hand, undertaking an internship as part of the master thesis always entails an individual, fully self-managed research project. Both types of internships require formal approval by the Board of Examiners.

The master thesis research is mandatory for all students and encompasses a credit load of 30 EC or 45 EC. Whether 30 EC or 45 EC is awarded rests mainly on the amount of empirical work to be done and the time needed for obtaining the required empirical data (e.g. for fieldwork abroad or large numbers of interviews). As described in the critical reflection, most master thesis projects include an internship. In recent years, 77% of the master theses have been drafted in an internship setting (at least partly).

In general, the committee concludes that the curriculum of the master programme reflects the broad, multidisciplinary field of the Environmental Sciences. It approves the way the dual mission of being broad in combination with in-depth knowledge is realized within the four tracks.

Internationalization of the master programme
As described in the critical reflection, the master programme strives to create a 'global village' with inputs from students and lecturers (guest lecturers) from diverse geographic backgrounds and by inviting international speakers.

All course modules that form part of the master programme are taught in English. About 40-50% of the students presently enrolled in the programme are from abroad, resulting in a very international student community.

Furthermore, both international and Dutch students regularly go abroad for study activities such as internships and independent research projects at other universities. Many of these internships and projects are organized via the personal contacts of the internationally oriented staff members of the Departments of Innovation, Environmental and Energy Sciences and Development Studies.

The Faculty of Geosciences has built up a network of 52 Erasmus partner universities for student exchange. Of these partner universities, 31 offer programmes directly relevant for Environmental Sciences students. Additionally, the programme takes part in the Joint International Master in Sustainable Development (JIMiSD). In this consortium, four EU and for non-EU universities have joined forces.

The committee appreciates the international orientation of the programme. However, it gained the impression that opportunities in JIMiSD could be used better to benefit both students and the programme.

2.2 Assimilation of the intended learning outcomes in the programme

The committee examined how the various components of the programmes contribute to the intended learning outcomes. It studied the matrices included in the critical reflections, setting out the components of the programme linked to the intended learning outcomes, and the study material of the different courses.

The committee finds that all three programmes are a good representation of the intended learning outcomes. It established that in the bachelor MNW programme and the master ES programme, every learning outcome receives adequate attention in the curriculum and the distribution of the learning outcomes over the curriculum is even and appropriate. However, it feels that the bachelor MMW programme avoids the natural sciences and doesn't provide students with sufficient opportunities to obtain an adequate understanding of environmental issues from a natural science perspective. Students take only one 7.5 EC mandatory course on this topic, in which they have to study all environmental problems. The committee is of the opinion that this is not sufficient to obtain a minimal environmental sciences background. Although students can supplement this with electives, the committee feels that this should be better incorporated in the compulsory framework of the programme and offer students restricted elective choices.

2.3 Didactic principles and teaching methods

The didactic principle of all three programmes is based on the philosophy that students acquire knowledge, research skills and competences best by means of a mix of teaching methods with an emphasis on self-study, teaching methods that stimulate students, and continuous assessment.

During the site visit the committee noted that this didactic concept is supported by the working methods and that there is a good balance between teaching methods. Each individual course has a mix of teaching methods varying from lectures (including guest lectures), group work, individual assignments, discussion meetings and presentations.

The committee especially appreciates the projects in the bachelor programmes (Environmental Advice Project) and the master programme (Transdisciplinary Case Study) in which students are confronted with the real-world problems of a real client.

The committee supports the philosophy of Utrecht University encouraging students to take responsibility for getting the education that fits their own interests. It is of the opinion that this philosophy contributes to a stimulating learning environment. However, it thinks that this high proportion of electives asks for a stronger guidance of students in finding their way towards a coherent, personalized curriculum. This is further elaborated in section 2.7.

2.4 Academic staff and student-teacher ratio

The committee established that all three programmes are taught by highly motivated staff. Most of the staff lectures in courses in their specialism, and all lecturers incorporate their own research into the teaching. Regarding the master programme, a recent evaluation of the research programmes of the Copernicus Institute of Sustainable Development resulted in assessments ranging from very good to excellent for all programmes, which demonstrates the high quality of the staff's research.

The committee appreciates the way the staff is stimulated to develop their teaching skills as part of their career development. It applauds the high proportion who have obtained the Basic Teaching Qualification or Senior Qualification in Teaching. It noted that a substantial number of the tenured lecturers also completed the intensive course of the Centre of Excellence in University Teaching.

As described in the critical reflections of the three programmes, the teaching staff receives high marks from the students. In addition, in the interviews with students, the committee did not note any indications of inadequate teaching qualifications.
During the site visit, the committee learnt that the teaching load within the whole faculty is 60%. In order to give lecturers the opportunity to conduct research, they should have at least one teaching-free period.

The student-staff ratios of the three programmes are listed in appendix 5. It varies from 13 (bachelor programme MNW) to 25 (bachelor programme MMW) to 38 (master programme ES). During the site visit, the committee learnt that these figures are misleading because they do not contain the amount spent on giving feedback (hidden cost). If this were incorporated, the figures of the three programmes would be more similar.

The committee gained the general impression that the staff has to deal with a high workload but realizes that this is almost inevitable given an intended teaching load of 60%.

2.5 Student intake and study load

Bachelor programmes MMW and MNW
Appendix 5 provides an overview of the number of students. These numbers show that between 2006 and 2012 the bachelor programme MNW had an intake ranging from 18 to 37. The intake of the bachelor MMW fluctuated between 24 and 55 students. During the two most recent academic years, around 20 students enrolled in the MNW programme and around 30 students enrolled in the programme MMW.

The committee feels that the enrolment for both bachelor programmes is on the low side but not so low that the programmes would not be viable, taking into account that also students of other programmes enrol in its courses.

During each course evaluation, the students are asked about the perceived workload. According to the critical reflections of both bachelor programmes, these systematic evaluations show that the programmes are too light. This was confirmed during the interviews with the students, the alumni and the educational committee. The students explained that the actual workload differs between courses and from student to student depending on their prior knowledge.

In particular, students from the MNW bachelor programme expressed that they could be challenged more since the knowledge provided on natural sciences is too superficial. During the site visit, the committee was able to look at course material and confirmed that the level of the natural sciences courses does not really challenge science students.

The committee advises both bachelor programmes to look into the issue of study load and adapt it to a level that suits the requirements.

Master programme ES
Throughout the years, the number of students enrolling in the master programme ES has gradually grown to approximately 100 students, with a dip in intake in 2008/2009 and again in 2012/2013. During the site visit, the management stated that the enrolment for 2013/2014 is again 100 students. The committee noted that only a small proportion of the students applying for the master programme hold a bachelor degree from Utrecht University. Between 2006 and 2012, about 6%-18% of the intake consisted of graduates of the MNW or MMW bachelor programmes. Most of the enrolling students completed their bachelor programme elsewhere in the Netherlands, in Europe or outside Europe. The committee considers the student intake as healthy. It applauds the broad range of nationalities and backgrounds of the students.

According to the university-wide policy, students may also enrol and start on the master programme at the beginning of the second semester (February 1st). The committee learnt that the programme management is not in favour of this policy and usually discourages students from doing so. Nevertheless, approximately ten students start in February each year. The management of the programme hopes that the programme will be exempted from this university-wide policy in the near future. The committee is in favour of such an exemption, because the policy disturbs the learning lines set out by the programmes.

From the interviews with the students and alumni, the committee learnt that the workload of parts of the master programme is high and the curriculum is demanding, but still feasible. It finds the study load acceptable in general.

2.6 Drop-out and efficacy

Bachelor programmes
The committee noted that the MMW bachelor has a high drop-out rate in the first year. Between 2006 and 2012, about 35% of the MMW students left the programme during or after the first year. The drop-out rate of the MNW is lower; about 25% of the MNW leaves the programme during or after the first year.

According to the critical reflection, the relatively large drop-out of MMW students may be partly explained by the fact that the MMW programme does not have an entry requirement apart from a VWO diploma. Therefore, it attracts a relatively large contingent of students who may not have thought about the match between the programme and their interests and capacities. The management explained that several initiatives have been put in place to prevent this mismatch. It has high expectations of the recently introduced, university-wide 'matching days'. Since 2013, students who want to enter a bachelor programme are required to visit the university for an entire day. They are accompanied by current students and visit two real lectures from the programme and can ask questions of the study advisor. Afterwards, prospective students perform a small case study on a problem in the Environmental Studies field. Following university-wide policies, matching activities will be continued in the upcoming years.

Despite the low study load, a large percentage of MMW students take more than three years to finish their bachelor programme. On average, 68% of the MMW students who continue their studies after the first year graduate within 4 years (compared with 84% of the MNW students).

During the site visit, the committee learnt that the substantial delay among MMW students is considered to be a consequence of many enrolling students having expectations that are not met in the programme. These students appear to be less motivated, with noticeable effects on their study progress.

The committee applauds the recently implemented matching activities and feels that they could especially benefit the MMW programme by preventing the enrolment of less motivated students in this programme.

Master programme
As described in the critical reflection, 53-82% of each cohort is able to complete the programme in the nominal time plus 1 year. The average for all 2006-2009 cohorts is 68%, with an average of length of 28.8 months.

Every year some students drop-out before graduation. In many cases, they shift to other master's programmes, such as Energy Science. The number of these early exits has decreased over the years.

2.7 Tutoring system and quality management

Tutoring system
The IEES Study Advisor provides the individual study coaching for all bachelor and master students in IEES programmes. The Study Advisor is the students' first port of call for questions and problems regarding study delays, study planning and progress, changes in degree programme, discontinuation of studies (permanently or temporarily), optional modules, studying abroad, etc. Additionally, students may contact the Study Advisor in the event of communication problems or potential conflicts with lecturers. When appropriate, he or she may refer a student to specialist services like the Student Service Centre, International Office, Student Counselling and Psychologist's Office.

Within the IEES Department, the Study Advisor works with a student tracking system designed to actively support student progress. The tracking system enables the Study Advisor to address specific groups, and it also archives all individual meetings with students. Students who need special attention are flagged. Every October the tracking system is updated to match the current registration data, so that every re-registration and de-registration is noted. Roughly once per month the Study Advisor checks the status of the flagged students. Sometimes this means getting in touch with a specific student, sometimes it just serves as a reminder.

In the bachelor programmes, the Study Advisor meets the first-year students five times a year on a plenary basis to discuss issues such as the structure of the programme, study planning, registering for courses, choosing electives, studying abroad, what to do when one gets a negative BSA, etc. Besides these plenary meetings, the Study Advisor invites all first-year bachelor students to an individual meeting in September or October, when they can discuss individual personal issues, which may or may not have an influence on study progress. Thus, first-year students have the opportunity to meet their tutor three times before 1 November (nearly the end of the first period of the academic year): twice in plenary meetings and once during an individual meeting.

In the master programme, the Study Advisor addresses specific groups, either to present them with information they will need in the near future or to recap on their progress.

Examples of such groups within the master programme Environmental Sciences are: all pre-master students, first-year students with little progress, third-year master students with a potential study delay of more than one year, and international students from non-EEA countries.

Apart from the Study Advisor, the programme manager and lecturers are also available to help with issues such as planning. Especially in the master, the programme manager plays an important role.

During the site visit, the committee learned that the Study Advisor takes charge of guiding about 800 students. It is concerned about whether this is feasible, especially since the bachelor students are confronted with many choices. In the interviews with the bachelor students, it gained the impression that they are overwhelmed with all these choices. It received signals from several students that they would have benefitted from stronger guidance when choosing their electives. For example, several students explained they chose electives at an early stage of the programme and discovered later that they could no longer take the minor they wanted.

The committee learned that the programme management is working on a different tutor system in which the lecturers get a more prominent role.

The committee appreciates the support and guidance offered to the students. However, it thinks that the bachelor students need stronger guidance when choosing their electives. It strongly supports the introduction of a more individually based tutor system.

Quality management
The bachelor Education Committee consists of a lecturer and a student from each of the three bachelor programmes of the Department of Innovation, Environmental and Energy Sciences (IEES). The master Education Committee also consists of one lecturer and a student from each of the three master programmes of the IEES Department. Both education committees are in close contact with the bachelor Management Team or master Management Team of the IEES Department.

The Management Teams and the Education Committees each have about five meetings per year (e.g. every teaching period and one extra meeting regarding the education and examination regulations). The courses of the programmes are assessed in writing at the end of each period. If a course scores lower than a 7, it is explicitly discussed in the Management Team and Education Committee. Based on the proposed improvements by the teacher(s) involved and the advice formulated by the Education Committee, the Management Team then decides whether or not additional measures need to be implemented in order to bring the course quality back to the ambition level. The minutes of the previous bachelor/master Education Committees' meetings and the course evaluation results of the previous teaching period are standard agenda items for the bachelor/master Management Team. The bachelor/master Management Team provides the Education Committee with feedback about what it has done with the outcomes of the course evaluations.

During the interview with the Education Committees, the student members explained that they put lots of effort into hearing the students' comments. The committee was especially impressed by the 'course feedback groups' in which students and lecturers come together during a course, in order to give feedback on that specific course.

Overall, the committee applauds the active system of continuous improvement of the courses and feels that the students' opinions are clearly heard.

Considerations

The committee studied the curricula of the three programmes. It thinks that the curricula from the bachelor programme MNW and the master programme ES are a good representation of all intended learning outcomes. Regarding the MMW programme, it established that the compulsory framework of the programme does not provide students with sufficient opportunities to develop an adequate understanding of environmental issues from a natural sciences perspective.

The committee is in favour of the demand-driven design of the bachelor programmes and appreciates the free elective portion that provides room for students to specialise following their own interests. However, it also noted that the high proportion of electives detracts from the coherence of the programme. It feels that too much is left up to the students to find a good combination of breadth and depth and advises offering more support to students in finding their way.

The committee appreciates the international orientation of the master programme ES. During the site visit, however, the committee gained the impression that the opportunities in joint programme JIMiSD could be better used to benefit both students and the programme.

The committee established that the programmes have a clear didactic principle that is supported by the working methods employed. It is impressed by the highly motivated and skilled academic staff. It gained the general impression that the staff has to deal with a high workload but realizes that this is almost inevitable with an intended teaching load of 60%.

The committee feels the enrolment for both bachelor programmes is on the low side but not so low that the programmes would not be viable, taking into account that also students of other programmes enrol in its courses. It considers the student intake of the master programme as healthy and applauds the broad range of their nationalities and backgrounds.

Regarding the MMW programme, the committee has some concerns about the high drop-out rate and the study delay. It supports the recently implemented matching activities to prevent enrolment of less motivated students in this programme.

The Study Advisor plays a major role in assuring coherency in the individual curriculum of each student. The committee appreciates the support and guidance the institute offers to its students. However, it thinks that the bachelor students need stronger guidance in choosing their electives.

The committee noted that the three programmes apply a very active system of continuous improvement of the courses and feels that the students' opinions are clearly heard within this system.

Conclusion

Bachelor programme Environmental Sciences (MNW): the committee assesses Standard 2 as **satisfactory.**

Bachelor programme Environmental Studies (MMW): the committee assesses Standard 2 as **satisfactory.**
Master programme Environmental Sciences: the committee assesses Standard 2 as **satisfactory.**

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.

Findings

3.1 Assessment system

The organisation of examinations follows the Utrecht University educational model. Important features of this model are early feedback to students during the course and limited opportunities for resits. Early feedback consists of intermediate tests and assessments for every course in order to stimulate the students' learning behaviour and to monitor and give feedback on their realisation of the course's learning targets. Students also receive feedback on their progress in realising the course's intended learning outcomes when assignments are discussed during tutorials.

A variety of assessment methods are used, such as written exams, individual research papers, group papers, research posters, written assignments, and oral presentations. The faculty's assessment policy requires each course coordinator to submit a so-called exam matrix describing how the different forms of examination contribute to each of the intended learning outcomes of the course.

Grading models are prepared for all written exams and express: a) what is expected from the student to pass the exam; and b) how the various parts of an answer contribute to the final grade. The grading model thus serves as a way of ensuring consistency in grading while making the assessments transparent to the student. Exam matrices, grading models and exams are archived by the Teaching Institute and are available for review by the programme management and the Board of Examiners.

During the site visit, the committee studied several written exams and assignments. It established that they related well to the content of the courses assessed. It is convinced that the programmes have a good testing system in place.

3.2 Quality assurance

As described in the critical reflections, the quality assurance of examinations consists of three elements: professionalization of the teaching staff regarding examinations; evaluation of the quality of examinations by the teaching staff; and programme management-independent evaluation of examinations by the Board of Examiners. Each element is detailed below.

First, professionalization is developed through the improvement of assessment skills, which is part of each staff member's BKO and SKO evaluation and qualification. Furthermore, during staff meetings and lunch seminars, best assessment practices are discussed.

Second, as routine practice, the evaluation of the quality of assessment by teaching staff and programme management requires that all exams are reviewed by a colleague prior to setting in

order to ensure that the assessment correctly tests the performance of the students' intended learning outcomes.
Third, the Board of Examiners is responsible for the quality of the examinations. As of September 2011, the Committee of Assessments of the Faculty of Geosciences independently evaluates the quality of course assessments and the assessment of master theses. The selection of courses to be evaluated is partly random and partly based on signals received from lecturers or student evaluations. The Committee of Assessments gives feedback on best practices and suggestions for improvements to the Board of Examiners.

The committee is impressed by the very active way quality assurance is offered in all three programmes. It feels that the system is well organized and that it is kept alive, for example by the education days, lunch seminars and evaluations organised by the Committee of Assessments.

The committee greatly appreciates the way the Board of Examiners implemented its new role and responsibilities resulting from the changes in the Higher Education and Research Act introduced in September 2010.

3.3 Bachelor theses and master thesis

Bachelor programmes
Both bachelor programmes conclude with a thesis. The critical reflections stress that the thesis is not the proof that all intended learning outcomes have been achieved.

The bachelor thesis is scheduled as a regular course of 7.5 EC. In the MNW programme, students can choose from three formats for their thesis: a research report; a state-of-the-art review of a number of scientific papers; or a research proposal. It is possible to prepare a 15 EC thesis. In 2010-2011 and 2011-2012, 15% of participants on average opted for a 15 EC thesis.

In the MMW programme students can choose from four formats: a research proposal based on a literature review; a policy analysis; a policy design or a research paper about a particular environmental issue. It is also possible to prepare a 15 EC thesis. In 2010-2011 and 2011-2012, 44% of participants on average opted for a 15 EC thesis.

The committee thinks that the possibility in both bachelor programmes to expand the number of EC from 7.5 to 15 is dubious. It is of the opinion that there is no clarity about how the allocated credit load is determined.

In order to guarantee an adequate basis for starting the bachelor thesis course, strict entrance requirements are set in terms of what courses should have been completed. Students are required to develop their own thesis subject. This is a deliberate choice, since the MNW and MMW programme considers the identification of interesting research questions (from a scientific and a societal perspective) and the delineation of research subjects and questions as important research skills.

The committee read and assessed a selection of ten theses for each bachelor programme (Appendix 7). It established that some of them were narrow in scope and lacked a multidisciplinary approach. It understands that this is partly a consequence of the rather small study load allocated (7.5 EC). Although none of the theses the committee read were considered to be unsatisfactory, it believes it is dubious to call a paper of this size a thesis. It

advises either expanding the allocated study load to at least 15 EC or giving it a different name.

Master thesis
The research project is mandatory for all master students and is worth a study load of 30 or 45 EC. Awarding an extension from 30 to 45 EC mainly depends on the amount of empirical work to be done and the time needed for obtaining the required empirical data (e.g. for fieldwork abroad or large numbers of interviews). The committee thinks that the possibility to expand the number of EC from 30 to 45 is dubious. It is of the opinion that it is not totally clear how the allocated credit load is determined.
The empirical work culminates in a written report (master thesis) and an oral presentation, both in English. The master thesis project covers all intended learning outcomes of the programme.

Before beginning the master thesis project, the students submit a proposal containing a description of the research objectives, the research questions, and the methodological approach to the Board of Examiners. The proposal has to include detailed and explicit time planning. Time planning is necessary to allocate the appropriate study load, but it is also used to support the students in completing their project on time and to prevent delays in graduation.

Students perform their master thesis projects under the supervision of staff members from the Department of Innovation, Environmental and Energy Sciences or Human Geography and Spatial Planning (the Geography and Development group).

The committee read and assessed a selection of ten master theses (see Appendix 7). In general, it is of the opinion that the theses show that students have acquired knowledge and understanding at a level that matches a master programme and that they are able to conduct research at that level as well. It was impressed by the quality of some of them. It agreed with the grades awarded. The committee also studied the assessment forms attached to the theses and concluded that the written evaluation provided on the assessment form was extensive and helpful for the students.

3.4 Professional Activities after Graduation

The critical reflections of the bachelor programmes state that the programmes equip students to participate successfully in postgraduate training programmes, since employers almost exclusively prefer graduates holding a master's degree.

Bachelor programme MNW
A large proportion of the graduates from the MNW programme continue their studies in a master's programme. In the bachelor exit survey 2010-2012 (n=30), 80% of the students indicated that they would continue in a master's programme; 13% were planning to stop studying temporarily; 3% were continuing with a second bachelor's degree; and 3% were starting work.

Of the 91 MNW graduates from 2007-2008 to 2011-2012, 63% continued with a master's programme at Utrecht University. One-third of them were admitted to the master's programme Sustainable Development, while others continue studying in one of the other programmes in the Faculty of Geosciences or the Faculty of Science. Some graduates

continued their education outside Utrecht University, mainly at Wageningen University or abroad.

Bachelor programme MMW
In the bachelor exit survey 2010-2012 (n=23), 83% of the MMW students indicated that they would continue in a master's programme; 13% were planning to stop studying temporarily; and 4% were starting work.

Of the 75 MMW graduates from 2007-2008 to 2011-2012, 28% continued with a master's programme at Utrecht University. Of these students, 62% were admitted to the master's programme Sustainable Development, while others continue studying in one of the other programmes in the Faculty of Geosciences, the Faculty of Law, Economics and Governance or the Faculty of Science. Some graduates continued their education outside Utrecht University, mainly at Wageningen University.

Master programme ES
Every three to four years, surveys are carried out amongst alumni in order gain their insight into the labour market position of graduates. The most recent alumni survey was conducted in 2012. Its results recently became available and indicated that the majority of alumni from the Environmental Sciences programme had found their first job within two months after graduation. Currently, 55% of the alumni (N=66) is working in the environmental field, 39% is working in a different field (the remaining 6% is unknown).

Considerations

The committee is convinced that the three programmes have a good testing system in place. It applauds the use of test matrices and grading models. It appreciates the assessment form and written feedback regarding the master theses.

The committee is impressed by the very active way quality assurance is offered in all three programmes. It greatly appreciates the way the Board of Examiners implemented its new role and responsibilities resulting from the changes in the Higher Education and Research Act introduced in September 2010.

The committee read and assessed a selection of ten theses from each programme. It established that some of the bachelor theses were narrow in scope and lacked a multidisciplinary approach. In general, it agreed with the grades awarded. The committee is of the opinion that the master theses show that students have acquired knowledge and understanding at a level that matches a master's programme and that they are able to conduct research at that level as well. It was impressed by the quality of some of the theses. In general, it agreed with the grades awarded.

The committee appreciates that most graduates find a job immediately after graduation.

Conclusion

Bachelor programme Environmental Sciences (MNW): the committee assesses Standard 3 as **satisfactory.**
Bachelor programme Environmental Studies (MMW): the committee assesses Standard 3 as **satisfactory.**
Master programme Environmental Sciences: the committee assesses Standard 3 as **good.**

General conclusion

The committee concludes that the objectives and intended learning outcomes of the bachelor programmes MNW and MMW and the master Environmental Sciences meet the standards required for an academic bachelor or master programme and fit well in the domain of Environmental Sciences.

According to the committee, the content of the curriculum and the available staff constitute an attractive teaching and learning environment for the students. It has a few recommendations for further improvement.

The committee is impressed by the assessment system. It appreciates the use of test matrices and grading models and the way the Board of Examiners has implemented its new role and responsibilities.

During the site visit and in this report, the committee has made several remarks and recommendations to improve the programmes further. Despite these remarks, it is of the opinion that both the bachelor programmes MMW and MNW and the master programme Environmental Sciences can be qualified as 'satisfactory'.

Conclusion

The committee assesses the *bachelor programme Environmental Sciences (MNW)* as **satisfactory.**
The committee assesses the *bachelor programme Environmental Studies (MMW)* as **satisfactory.**
The committee assesses the *master programme Environmental Sciences* as **satisfactory.**

Appendices

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

Prof. W.A. Hafkamp (chair of the committee) is professor in Environmental Sciences, Erasmus University Rotterdam (1994- present). He graduated in Econometrics from Tilburg University (1977), was appointed assistant professor at the Economics Faculty of the University of Amsterdam (1977-1984), and received his PhD in economics at the Free University, (thesis: 'Triple Layer Model; An Economic-Environmental Model for The Netherlands'). He was head of the Economic-Technological Department of the Institute for Environmental Studies of the Free University Amsterdam (1984-1998) and a professor of Environmental and Nature Conservation Studies of Tilburg University, Faculty of Economics and Econometrics (1990-1995). Professor Hafkamp was Dean of the Faculty of Social Sciences of Erasmus University, where he was also involved in setting up the master of Strategic Urban Studies (2001-2005). Besides being a professor, he is a consultant and practitioner. He worked for KPMG Environmental Consulting and was a member of the Management Board of the Joint Programming Initiative Urban Europe. He was scientific director of Nicis Institute, The Hague, the Netherlands Institute for City Innovation Studies. He has over 25 years of experience in research, policy and practice, on issues ranging from transport and environment, urban development and spatial policy, environmental management in industry, waste management and safety to sustainable development. He was, and in some cases still is, member or chair of numerous councils, committees and boards.

Prof. I. Janssens is research professor at the University of Antwerp (since 2003), affiliated to the research group of Plant and Vegetation Ecology. He studied Analytical Chemistry (Bachelor, 1987), Environmental Sciences (Master, 1991), Biology (Bachelor + Master, 1995) at the University of Antwerp. He obtained a PhD on Soil carbon cycling in 1999 (highest distinction, University of Antwerp, funded after obtaining a highly competitive grant from the Flemish National Science Foundation). After his PhD, Ivan Janssens obtained two consecutive, highly competitive, post-doctoral grants from the Flemish National Science Foundation. During this period, he worked at the Australian National University (Canberra, Australia, to get acquainted with stable isotope applications in ecology) and at the University of Tuscia (Viterbo, Italy, to specialize in the eddy covariance technique to study ecosystem-atmosphere interactions, and in ecosystem manipulation methodologies). Professor Janssens' overarching research focus is the functioning of terrestrial ecosystems, with a strong emphasis on soil processes, ecosystem biogeochemistry (carbon, nitrogen, and recently also phosphorous cycles), greenhouse gas emissions, and on how these ecosystem responses are affected by climate change and by atmospheric pollution. Prof. Janssens was a member of the Review Committee in Climate Studies at Wageningen University (2012).

Prof. A. Jamison is professor in Technology, Environment and Society, Aalborg University, Denmark. In 1970 he obtained his B.A. (Bachelor of Arts) magna cum laude in History and Science, Harvard University. He was an external lecturer (Science and Society), University of Copenhagen (1976-1984), and in 1983 he obtained his PhD in Theory of Science at the University of Gothenburg, Sweden (thesis 'National Components of Scientific Knowledge: A Contribution to the Social Theory of Science'). He was the organizer and teacher of courses on theory and methods of environmental science and social movements and politics at Malmö University College. He was also the organizer and teacher of a course on perceptions of technology at Denmark's Technical University (DTU). He is coordinator of the Program of Research on Opportunities and Challenges in Engineering Education in Denmark. He served as a consultant for the ESSENCE network that was funded by the EU to investigate higher education in the environmental field. He was also coordinator and co-founder of a

master degree program in environmental management at Aalborg University and served as a guest professor in the environmental studies program at Malmö University College.

Prof. I. Loots is professor at the Department of Sociology and the Institute of the Environment and Sustainable Development (IMDO) at the University of Antwerp since 1992. She studied Political and Social Sciences (Bachelor, 1978; Master 1980) and defended her phD on urban spatial development and urban networks in 1990. She teaches in the Sociology Department and the interdisciplinary master Environmental Sciences and also in the postgraduate programmes Environmental Coordinator and Energy & Climate. She has been a member of several boards of examinations and educational committees. Besides being a professor, she was an advisor to the Technology Assessment Board within the Flemish Parliament (2001-2011) and several policy oriented research organizations like the Flemish State of the Environment Reporting Agency, the Research Institute for Nature and Forest, the Institute for Technology Research VITO and the Advisory Group on Climate Change and Social Justice. Her overarching research focus is the analytical aspects of policy renewal, policy organization and evaluation, public support and stakeholder participation (multi-actor settings), inter- and transdisciplinarity (science-policy-society relations and boundary work), the social construction of risk, risk governance and social impact assessment. She was a jury member of the Dutch Visitation Committee of Environmental Sciences in 2001 and of the Accreditation Organization of the Netherlands and Flanders (NVAO) for the accreditation of the master programme Industrial Ecology (Delft University and Leiden University) in 2009.

Mrs. L.H.A. van der Sanden is a master student in Social and Political Sciences of the Environment, Radboud University, Nijmegen. She also obtained her Bachelor in Environmental Sciences at Radboud University, Nijmegen. She was a member of the board of the Student Union for Environmental Sciences 'Milieuprisma' (2009-2010) and of the educational committee (2008-2011).

Appendix 2: Domain-specific framework of reference

Dutch-Flemish referential framework for academic environmental education

This text is the result of discussions between the academic heads of the Dutch and Flemish environmental education programmes. In anticipation of the visitations and accreditations scheduled in 2013/14 and 2015/16 respectively, they deemed this an appropriate time to draft a collective referential framework.

Generally speaking, this Dutch-Flemish referential framework aligns with the Bologna Process, from which the 'Framework of Qualifications for the European Higher Education Area' (FQ-EHEA) was born. In formulating this referential framework, close attention was paid to the demand for a 'domain-specific referential framework' (DSF) by the Dutch QANU and the demand for 'domain-specific intended learning outcomes' (DSL) in Flanders.

All Dutch and Flemish environmental education programmes offered at university level – as well as those offered at the vocational level in Flanders – were invited to discuss this collective referential framework. Many attended these meetings and have made substantial contributions to this text. These meetings offered attendees the opportunity to identify and assess the similarities and differences between the programmes, and much progress was made. While this referential framework partially builds on earlier international benchmarks (see below), it also strives to take a bold new step towards a European benchmark for academic environmental education, the added value of which needs no further explanation.

Although many Dutch and Flemish environmental programmes collaborated on this referential framework, they do not all intend on formally implementing it: some are seeking accreditation as environmental programme, while others prefer to focus on specific environmental themes and attach more importance to visitations with colleague institutions in the fields of e.g. engineering or chemistry. Even the programmes that do endorse this DSF/DSL are not expected to identify with every element. They are, however, expected to use their respective 'self-evaluation' and 'critical reflection' reports to position their programme within the general framework of this document. In both cases, this document will serve as a general frame of reference only.

The document begins with a description of the environmental sciences domain (1) and moves on to discuss earlier initiatives taken towards establishing an international benchmark (2). It then offers a brief history of academic environmental education in the Netherlands and Flanders (3), including their similarities and differences. This will be used to discuss the academic competencies for bachelor and master degree programmes (4). The document will then explore the labour market for environmental scientists (5) and will conclude with the academic goals for environmental education at the bachelor and master levels (6).

1. Environmental Sciences: a description of the discipline

With the advent of environmentalism in the 1970s, academic environmental research and education gained a serious international foothold. As a result of this academic research and education, the environmental sciences domain developed into an established and accredited field in the Netherlands, Flanders and abroad, with its own 'body of knowledge' (Scholz, 2011), chairs, departments, academic education and research programmes, scientific organizations and journals. Environmental education now enjoys excellent contacts with professionals in the environmental market, bolstering it with skilled experts and collective

research. These environmental professionals have since organised themselves into distinct associations.

Several definitions of environmental sciences are available in both the Low Countries and the international arena (see Udo de Haes, 1984; Stern, 1993; Boersema and Reijnders, 2009). A closer examination, however, will reveal certain parallels: the environmental sciences concern the study of human-induced environmental problems. The word 'problem' is crucial here: from the outset, the environmental science discipline has profiled itself as a solution-oriented and mission-oriented field, deeply rooted in society (Broekhans, 2003). With its problem-solving nature, the environmental sciences focus on analysing and explaining environmental issues in order to find a suitable approach and solution. For the natural sciences, this means an examination of the physical, chemical and biological mechanisms of environmental degradation. The ensuing explanations provide for the design, implementation and evaluation of technical and engineering strategies. For the social sciences this means that, in addition to research on societal causes such as demography, economy, technology and culture, the discipline also offers political and policy solution strategies. All of the environmental sciences position their diagnostic and solution-driven approach within spatial and temporal dimensions – including interactions between the 'here and now' and the 'there and later' – with an eye for the complexity and uncertainty of environmental issues. For all environmental scientists, the effectiveness, political robustness and social legitimacy of any approach or solution must also be the object of research and reflection. From the very start, environmental scientists in the Netherlands, Flanders and abroad have proclaimed themselves to be interdisciplinary by nature. The environmental science discipline comprises the natural sciences, the social sciences, and the technical and medical sciences, and attempts to integrate the myriad of perspectives within these disciplines into one complementary whole.

In short: the environmental sciences examine human-environment interactions and the resulting problems from an integrated and interdisciplinary perspective. Much like Crutzen and the 'anthropocene' (2002), environmental scientists, borrowing from cognitive and ethical insights, believe that human activities have led to the serious degradation of our natural environment, the repercussions of which affect society as a whole.

Since the publication of Our Common Future in 1987, the sustainability sciences have gained considerable ground. Interdisciplinary by nature and borrowing heavily from cognitive and ethical insights, this discipline promotes the necessary transition towards a more sustainable society. The sustainability sciences also embrace dozens of concepts, approaches and themes from the environmental sciences, including systems thinking, modelling, and transitions, among others. The environmental sciences, however, take their own stance within this field: to them, sustainable development is a distinct object of (diagnostic and solutions-oriented) research and the driving force behind ethical scientific and social actions. Although 'sustainable development' is often viewed in its broader context, environmental scientists primarily focus on the ecological aspect of the 'planet' pillar. Like sustainability sciences, environmental sciences primarily emphasise different yet cohesive time-space scales, constantly connecting the 'here and now' with the 'there and later'. Both the environmental and sustainability sciences appreciate the complexity of environmental issues, the limits of human knowledge and the ethical implications of both in terms of their uncertainty, precautions and risk governance.

Of course, environmental science activities – or in this case environmental education programmes – cannot pay equal attention to all of these aspects. Environmental scientists can decide to highlight the natural or social science aspect, the cognitive or ethical aspect, or the

design or analysis aspect. They can also focus on specific themes, such as water, biodiversity, energy, industrial processes or global governance. Regardless of how they position themselves, environmental programmes must always keep a keen eye on the different dimensions and aspects of the environmental sciences.

2. Environmental Sciences: inspiring international benchmarks

The environmental science programmes offered in the Netherlands and Flanders were inspired by earlier benchmarks published abroad. In this case, 'benchmark' should be defined in the broadest sense of the word as a set of desires, demands, aspirations, qualifications and conditions for environmental science education, independent of the demand for formal status as an instrument of accreditation. Moreover, inspiration is sometimes roused by the content or substantive aspects and sometimes by the method or approach. In short: three inspirational reference points.

ES3

In 2007, the English Quality Assurance Agency for Higher Education published a revised version of their 2000 benchmark for Earth Sciences, Environmental Sciences and Environmental Studies (ES3) (see: www.qaa.ac.uk/academicinfrastructure/benchmark/statements/earthsciences.asp). This report largely focuses on the substantive benchmark for bachelor programmes in these fields. Various substantive elements – including (sub) disciplines (geochemistry), themes (environmental hazards), and concepts (renewable energy) – are presented as (sub) categories in a virtual field. The advantage of such an approach is that it clearly traces the historical transformation of the ES3 fields, starting with their classification under more traditional natural sciences, like geology, to their reclassification under the earth sciences, to the more interdisciplinary environmental sciences. What is more, the report identifies a wide variety of essential substantive elements, to which different subsets apply in environmental sciences rather than in earth sciences. In identifying these substantive elements, the ES3 report reveals striking similarities to an earlier report: 'Wisconsin's Model Academic Standards for Environmental Education' (1998). The drawback of the ES3 approach is its strong inclination to the natural sciences. Disciplines and niches such as environmental economics, environmental sociology, environmental policy science, environment and nature education, and science and technology studies are not included. It also fails to highlight the importance of the ethical aspects described above and the continuum between fundamental and applied, and explanatory and design research. A logical counterpart to this strong substantive focus is the limited attention paid to academic, professional, methodological and reflexive skills.

AUDES

In the 1990s, several European academic environmental programmes founded the Association of University Departments in Environmental Sciences (AUDES). Biennial conferences were held to discuss the exchange of knowledge and academic curricula and to draw up individual country reports. These meetings inspired Jamison and Maarleveld (2001) to draft an assessment report which stated that, as a whole, European environmental education pays due attention to scientific, social and ethical themes. With an eye towards the further professionalization of these programmes, the report defined a common knowledge base that could serve as a kind of core curriculum for all environmental programmes.

This core curriculum consisted of five elements: moral and ethical issues, the relationship between the environment and society, technical orientation, theoretical orientation and a variety of practical skills, each of which receiving further elaboration. It was never their

intention to have all environmental education programmes blindly adopt these five elements as part of their core curriculum, nor was it their intention to incorporate them into a rigid accreditation process. These elements were intended to set the common standard for all environmental programmes and facilitate the international exchange of information in the short term and lead to the creation of professional standards for environmental professionals in the long term. The advantage of this approach lies in its identification of broad and coherent fields of interest and its ability to bridge the gap between what they considered to be classic contradictions: academic versus professional; natural versus social sciences, and so on. The disadvantage is that such broad fields of interest are also subject to various interpretations. With a European ambition, it is easy to see how the latter may seem inevitable.

Multilateral benchmarks

Some Dutch and Flemish environmental programmes are involved in multilateral and/or European agreements with sister institutions, while others prefer to focus on North-South themes only. This does not lead to an all-embracing benchmark for the whole field, but rather to independent agreements about the design, content and implementation of programmes resulting in the gradual convergence of departments. The following is a non-exhaustive list of environmental programmes with Dutch and Flemish participants, founders and coordinators:

- JIMiSD is de Joint International Master in Sustainable Development. The programme connects natural scientific and social scientific knowledge to the development and evaluation of sustainable development policies in developed and developing countries. This programme was developed by University Utrecht in cooperation with four other European and four non-EU universities (http://www.uu.nl/faculty/geosciences/EN/studying/informationforstudents/masterprogrammas/SUSD/JointProgramme/Pages/default.aspx).

- IMETE is the International Master of Science in Environmental Technology and Engineering. This programme is coordinated by the University of Gent (www.imete.ugent.be).
- EMMEP, the Erasmus Mundus Minerals and Environmental Programme, offers a specialised European Geotechnical and Environmental Course that highlights the environmental and geotechnical aspects of mining. This programme is coordinated by TU Delft (www.master-emae.org).
- Planet Europe is a Joint Master Programme initiated by Radboud University Nijmegen in cooperation with the Blekinge Institute of Technology and Cardiff University that prepares graduates for a career in environmental and spatial planning in Europe (www.planet-europe.eu).
- LECH-e stands for Lived Experience of Climate Change. This master track (30 EC) was developed by the Open University in collaboration with six other European universities and focuses on developing multidisciplinary knowledge and skills in the field of climate change and personal experience (http://www.leche.open.ac.uk/).

These and other collaborations between Dutch, Flemish and foreign environmental education programmes do not provide for an all-embracing benchmark. The programmes that collaborated on this referential framework and continue to collaborate in lasting partnerships can certainly claim moments of international exchange and coordination; of choices made and positions taken. In this sense, they are indeed a source of inspiration.

3. Environmental science education in the Low Countries: similarities and differences

It is impossible to describe the forty-year history of the environmental sciences in the Low Countries and abroad in just a few sentences. This section is by no means exhaustive. Instead, this historical sketch aims to describe the choices made in environmental education in the Netherlands and Flanders. These choices can be partly attributed to the different institutional contexts, but also to how each country dealt with the multitude of disciplines, perspectives and themes. This diversity also exposes the many similarities in the environmental science discipline. As the next section will reveal, the latter greatly contributed to the communal competencies we see today.

In the 1970s, environmental education was introduced in the Netherlands, predominantly in the form of interdisciplinary and interdepartmental (elective) courses. In the 1980s, many universities also began offering specializations or four-year programmes in environmental science. From the early 1980s, environmental science institutes and departments – since then grouped in the ICM, the Interuniversity Committee Environmental Sciences - began making agreements on distinct thematic specializations (energy, space, nature, policy and others) in their education and research. This allowed for a sharper classification of these programmes within the natural sciences, social sciences and other academic disciplines. During the first visitation of environmental education (VSNU, 1995), this multidisciplinary categorization and specialization was easy to identify. This type of profiling helped form the basis of the 2000 CROHO reforms, which divided these programmes into environmental natural science, environmental technology, environmental health, and environmental social science categories. The 1990s and early 2000s also ushered in new changes in the Netherlands: in addition to an interest in specific environmental education programmes, general environmental issues were receiving increasing attention from the more classic programmes like urban planning, chemistry, law, and engineering. To a certain extent, both of these variants played communicative roles. Participation in successive environmental science visitations continued over the years, with eleven visitations in 1995 (VSNU, 1996), five in 2002 (VSNU, 2002) and four bachelor and eight master visitations in 2007 (QUANU, 2007 and 2008). This amplified environmental focus led other programmes to sharpen their environmental profiles as well, or develop environmental masters – as was the case in Flanders from the very start (see below). Due in part to the Bologna Process, the Netherlands now has four environmental science bachelor programmes (UU x2, WUR and OU). The other, formerly undivided, programmes gradually merged their bachelors with broader programmes in biology, chemistry, geography and administration. This not only fits the trend of following up a broader bachelor programme with a more specific master programme, but has also led to a wider range of more specialised master programmes (see below).

Flanders has also seen the emergence of environmental science programmes since the 1970s. Like the Netherlands, some were based on interdepartmental collaboration, but most were specialised tracks offered within existing programmes. Unlike the Netherlands, however, these tracks never intended becoming independent programmes. In 2011, 20 to 25 environmental majors, electives and advanced master programmes were offered by various faculties within the disciplines of engineering, biology, applied medical and biomedical science, economics, management, and law. The continued development of environmental science programmes and specializations was largely a result of new environmental policies and regulations following the Flemish constitutional reforms of 1980 and 1988. That development led to a growing demand for environmental activities. Some of the more established environmental occupations (environmental coordinator, soil remediation expert,

EIA expert, environmental expert, environmental auditor, environmental verifier (EMAS), and energy expert), started demanding specific graduate or postgraduate degrees.

In Flanders, certain government regulations stemming from the Bologna Process led to further streamlining: while master programmes were required to have at least one related bachelor programme, the advanced study programmes were becoming financially unfeasible. As a result, many of the advanced master programmes were demoted to the status of regular master to ensure better alignment with multiple non-environmental bachelor programmes. While Flanders currently has two specialised environmental science bachelor programmes (HUB and HoWest), a structured dialogue between the various environmental science programmes has yet to be initiated. In 2007, seven environmental science programmes participated in the VLIR visitations (UA, UG x2, VUB x4). Flanders now has three specialised environmental master programmes; the rest are accredited as separate programmes within healthcare, (applied) biology, industrial science and other disciplines.

While the first impression to be drawn from this brief development history is one of great disparity, the following axes have introduced more structure to the field and allowed for the positioning of independent environmental education programmes.

The first axis is formality: there are undivided four or five-year programmes; three-year bachelor programmes; and one or two-year masters' programmes. This, according to FQ-EHEA regulations, has implications for the required competencies (see below). The second, substantive axis concerns the nature and extent of interdisciplinarity: this is used to define the multidisciplinary nature of the environmental science programmes within the natural or social science disciplines. Combined with the first axis, this differentiates the broad, multidisciplinary (environmental science) bachelor programmes in the Netherlands from the more disciplinary ones. Both types can be followed with a multidisciplinary but thematically strong master programme (Environment and Resource Management, VU; Energy and Environmental Sciences, RUG; and others) or a more general master programme (Environmental Sciences, OU,UA, UU, WUR).

According to the CROHO format, the Dutch master programmes are considered multidisciplinary within the divisions nature (Environmental Sciences, UU; Environmental Sciences, OU; Energy and Environmental Sciences, RUG), engineering (Industrial Ecology, TU Delft/UL), agriculture and natural environment (Environmental Sciences, WUR; Urban Environmental Management, WUR) or society and politics (Social and Political Sciences of the Environment, RU). They are all accessible to a relatively wide range of bachelor graduates, albeit often with the requirement of a pre-master programme. In Flanders, the seven visited master programmes (VUB, UG and UA) were all interdisciplinary yet all very different. Although sometimes accessible to a wider range of bachelor programmes, they were often limited to programmes within their own disciplines. The general pattern is that the more interdisciplinary in nature, the higher the student intake (Environmental Sciences, Human Ecology). This is in stark contrast to the selective entrance requirements held by specific natural science and engineering master programmes, with the latter often involving a more specific thematic focus (Environmental Sanitation, Environmental Remediation and Environmental Management).

An equally large number of other environmentally relevant master programmes in both Flanders and the Netherlands are not truly multidisciplinary. In this context, the term 'environmental programme' refers to an environmental specialization in another programme or discipline, often in the natural science and engineering disciplines. Several of these

Flanders-based programmes were involved in the development of this referential framework, even though they intend to maintain their accreditation as a natural science or engineering programme.

Thirdly, programmes can be positioned on the continuum between research-oriented and career-oriented profiles. Those who use terms like 'the academic professional' indicate their need for a middle ground between research and career-oriented skills. This applies in particular to the master programmes. While the Social and Political Science of the Environment programme (RU) and the Environmental Science programme (UU) highlight the research-oriented approach, the Environment and Resource Management programme (VU) and the Environmental Science programme (OU) prefer a more career-oriented approach. In Flanders, the interdisciplinary nature of the programmes offers a wide variety of career prospects in the research, management and policy sectors. Several programmes have integrated the aforementioned – and for some programmes compulsory – entry requirements (e.g. Environmental Coordinator). For some of these occupations, strict conditions have been set for the accreditation of the profession, but not for the programme itself.

The fourth and final axis on which environmental programmes revolve is that of internationalization: in terms of content, they all pay close attention to transnational and global perspectives on environmental issues. Where they differ is in their linguistic and thematic preferences (e.g. English instruction with a strong affiliation for development issues). These preferences can be easily identified by the cultural diversity of their student bodies (which may or may not be supplemented by Erasmus exchange programmes, Erasmus Mundus programmes or Joint Curriculum Development programme – see list), their pursuit of international benchmarks and the career prospects of their graduates.

Flanders is in a very different position here: introducing a language of instruction other than Dutch is a considerable responsibility (Decree by the Flemish government on regulating the responsibilities and requirements of introducing a language other than Dutch, B.S. 08/11/2004). For this reason, the influx of foreign students in Flanders is largely regulated by specific programmes that target an international audience, primarily 'the global South'. The internationalization of Flemish education is often supported by ICP programmes aimed at students from developing countries. Together with Erasmus Mundus, they strive to develop joint master programmes in international partnerships (see above). Other programmes work with foreign guest lecturers, short study trips to supplement courses or the master thesis, or with virtual environments for foreign students.

4. Competences of an academic environmental scientist (m/f)

Any observation regarding the competences after having completed an academic environmental study should distinguish between bachelor and master level, as defined by the FQ-EHEA (the Framework of Qualifications for the European Higher Education Area). The next step is to distinguish between generalist and the more specialised studies. The final step is the consideration of ethical and reflexive competences.

In general terms, the academic bachelor graduate is expected to be able, with some support, to reason at a scientific level and to apply the knowledge and insights acquired. This implies that graduates from an environmental study at bachelor level can, without further qualifications, carry out fieldwork and supportive or executive tasks in, for instance, for EIA-related research, standard policy development or project work. Screening of the pre-masters for higher vocational education graduates reveals that they are particularly focused on

complementing the professional skills already acquired with the scientific skills needed to take up the academic environmental study at master level (entry level master). Following their master, the graduate is capable of independently functioning at a scientific level, i.e. able to develop ideas in research or expertise in an original way, and also to apply these ideas in new, more complex or uncertain situations.

As stated, environment-generalist studies can be distinguished from environment-specialist studies. Generalist studies are oriented toward a more generic job profile and, consequently, need to cover a broader spectrum of disciplines and methods. They educate students to become an all-round researcher, environmental advisor, process supervisor, environmental coordinator, sustainability expert etc., in both private and public organizations. The substantive, methodical, strategic and communicative skills aspired to are focused on being able to reason and to constantly be alert to the context in broad areas of science, both scientifically (interdisciplinarity, complexity, uncertainty), and socially (political sensitivity, social unrest). This is expressed in (the demands on) the problem theorem of the master research and thesis, and possibly in the inclusion of practical aspects in execution and assessment. In addition, where specific environmental themes such as water pollution or sustainable production processes are involved, the generalist gives priority to the interaction between environmental subdivisions and sustainability aspects, to social opportunities and effects, and to the multiple-layered character of issues and solutions in time and space. The avoidance of 'shifting' of environmental problems in time, space or otherwise is thereby a crucial motive. The compilation of often dissimilar knowledge, maintaining an overview, making integral assessments, comparison and integration are essential cognitive and methodical competences. The specialist is more geared to concentrating on a specific component, such as polluted riverbeds, eco-design and environmental law. Even though these studies also comprise several disciplines, there is one key discipline. Furthermore, the quality of this process, subdivision or field of effect is the central point, and the context is not the deciding factor.

Environmental education programmes also differ in the motivation and social attitude of the environmental sciences and the environmental professional. They can be more or less focused on the analytical competences required to understand environmental issues, or more intent on solution-focused skills. Other divisions of focus are social motivation, passion and ethical reflexes. At bachelor level, social motivation and ethical aspects are recognised, if nothing else; they are, incidentally, related to a cognitive analysis of the background of environmental issues, and are therefore also objects for study. At master level, students are challenged to involve normative principles in their research, based on assumptions like environmentally responsible solutions, sustainability, socially responsible entrepreneurship, intra- and inter-generational justice, prevention and precaution, safety, etc. Programmes can, however, also compel the environmental professional to steer away from social choices and to seek the ethical norm in classical attitudes of the scientific sphere: scientific curiosity and innovation, but also dissemination of knowledge and service provision. Whereas the first type of study places more emphasis on practical issues, interventions and finding solutions, the second type focuses on scientific research and design routines. This differentiation should not, however, be interpreted as the difference between fundamental and applied or intervention-oriented work, nor as an indicator for academic levels.

Finally, environmental programmes pay attention, albeit in varying degrees, to skills aimed at the reflexivity of the –future- environmental professional. Apart from interdisciplinarity and methodical diversity, this also involves the necessary skills for coping with scientific uncertainty and social sensitivity, and with homing processes. Communicative skills are

indispensable in this regard. Simultaneously, there must be a firm basis of classical rational target-oriented strategic thinking and systematic action, and of result-oriented process control. The ability to work under given personal, financial and temporal conditions is thereby of importance. The aforementioned skills lead to a certain level of classical and contemporary management skills. The skills areas, professionalism, and reflexivity are essential for intellectual quality. Those publishing on the subject of bio-fuels or who create designs for a new generation of refining techniques must, by means of an argumentative attitude, be able to deal with the critical reactions of peers and, at the same time, be sufficiently structured and thorough to be able to continue on the determined path. Nevertheless, in a context of global risks and complex environmental issues, reflexive skills are of more value to the environmental professional than 'classical' strategic thinking and acting.

5. Labour Market

Although no recent and systematic research is available, all the signs indicate that the labour market for environmental scientists is, in quantitative terms, reasonably stable whereas, in qualitative terms, it shows an increasing diversity of professional profiles. Some scenarios even show a future shortage of 'green professionals' (Bakker, 2011; ROA, 2011). Rather than speculating on this, in this section we pay attention to the manner in which programmes are attuned to the needs of the field, and to the degree of success of graduates.

Tuning to the needs of the professional field
Programmes in both the Netherlands and Flanders are in fairly regular consultation with the professional field through a variety of channels: through participation in advisory councils, professional field committees or sounding board committees, often following curriculum reviews and/or visitations; through interaction at all kinds of congresses and workshops; through research programmes, traineeships and graduation projects on behalf of and at organizations in the associated field, and, more recently, through professional social media such as LinkedIn. In the Netherlands, moreover, there are continuous contacts with the VVM (Association of Environmental Professionals), in particular via the VVM-section 'Environmental Education and Labour Market' (MO). In Flanders, master course providers are in consultation with, for instance, the employers and professionals of VOKA (Flemish Employers Association), UNIZO (Employers' Network) and VIK (Flemish Chamber of Engineers), with Vmx (The Association of Flemish Environmental Coordinators), with VMD (Flemish Environmental Experts), and with FEBEM (Federation of Environmental Companies). Whereas these national associations are, as a rule, members of international professional associations, such as ENEP/EFAEP (European Network of Environmental Professionals), the synchronization with the professional field is usually oriented toward the Netherlands and Flanders.

From a historical viewpoint (see section 3 above), it has become clear that environmental education in Flanders is partly determined by the fact that certain profiles and competences are laid down in the regulations required for certain recognised jobs and professions. This is also a mechanism for connecting to the labour market.

Graduate success
Although academic bachelors can, in principle, start on the labour market, there is little systematic information available on the civil effect of the bachelor study. In the field of environmental education, the impression prevails that bachelor graduates, sometimes with a number of years' experience, go on to take a master degree, since neither the student nor the

employer regard the bachelor level as a final qualification. In Flanders, the government Higher Education Register literally states in 2011-2012: 'The academically oriented bachelor study is, in fact, not aimed at the labour market. (…). However, this does not mean that these graduates cannot find a position on the labour market, as there is also a demand for graduates from academic bachelor programmes (e.g. IT professionals)'. And further: 'For academically oriented bachelor programmes, the move to a master is the main goal'. Therefore, also in Flanders environmental professionals who only hold an academic bachelor degree are an exception.

Environmental education providers are, through surveys among their graduates, reasonably well informed about the labour market for their graduates. In a general sense, the job opportunities for environmental scientists follow the economic climate of the general labour market. The environmental labour market does, however, exhibit specific trends with regard to specific environmental themes: from soil sanitation to EIA in the eighties and nineties, and, more recently, from sustainability assessments to renewable energy projects. The cessation of a specific demand (recent example: nature conservation) also becomes quickly apparent.

The survey of graduates from all academic environmental programmes shows, across the full spectrum, that these graduates tend to succeed and that, even when the public interest in the environment declines (after 1992-93, and after 2001) and in a poorly-performing economy, jobs are still available for environmental scientists with good qualifications. These opportunities can be mainly found in professional profiles on a continuum from research to advice. On the Dutch market, the proportion of private consulting firms is much larger, whereas in Flanders the emphasis is more directed to public organizations. A recent communal trend which is also visible in the environmental labour market, is the continual increase in the number of independent businesses, particularly consultancies in the field of environmental and energy technology, environmental communication, etc. NGOs are also increasingly active as environmental service providers, advisors etc. All this contributes to an increasing diversity of profiles on the environmental labour market. As already indicated, more and more academic programmes are providing courses with an 'environmental aspect' in addition to the existing academic environmental programmes.

Finally: although academic environmental programmes increasingly focus on foreign students, there is only limited information available regarding the labour market situation of graduates who have returned to their country of origin. This also applies to 'native' students who have gone abroad.

6. Consequences for the final attainment levels

This DSF/DSL is, by definition, not the platform to formulate final attainment levels of specific programmes. This will be done by the programmes themselves through their 'self-evaluation' or 'critical reflection' reports. In this last section, we have formulated implications for the final attainment levels in the form of points of attention which should be worked out in more detail.

In the first place, final attainment levels should cover the essence and the entire breadth of the field of environmental sciences, as described in section 1, including the positioning in that field. On the level of the specific programmes, not only the international benchmarks stipulated in section 2 may serve as a source of inspiration, but also the involvement in multilateral alliances. Secondly, the final attainment levels of each programme should do

justice to the positioning of that particular programme with regard to the various characteristics and dimensions stipulated in section 3. This, of course, concerns the level, bachelor or master, and the way in which the level of access to the master programme is warranted. It also concerns the positioning of the course in respect of the nature and the degree of interdisciplinarity and, particularly at a master level, the consolidation in a (dominant group of) discipline(s) and the thematic choices or omissions. In addition, programmes should indicate their positioning with regard to research and/or vocational orientation, and for which social roles and/or professions they primarily aim to educate their students. Finally, the above means that courses should indicate their policy on internationalization, both with regard to inflow and outflow.

Bachelor in Environmental Sciences

Students who have completed an environment-specific bachelor programme have at least the domain-specific knowledge and skills set out below. The student:

General:

- is able to define environmental issues as human-environment interaction issues, to indicate the multi-faceted nature of these issues, to identify the aspects in this regard that require either typical natural or social science research, and to argue the necessity and the interconnection of a variety of disciplinary approaches.
- is able to identify the nature, the extent or gravity and the background of environmental issues, to further analyse and interpret these aspects using scientific concepts, theories and methods, and to formulate recommendations for dealing with these issues.
- is able to position environmental issues within the context of 'sustainable development' as an object of scientific practice, as a directive and as a background for transition-oriented intervention.

Depending on the specific focus of programmes on natural science or social science:

- is familiar with natural science cause and effect processes and is able to apply natural science approaches and methods of analysis (e.g. generating models, systems analysis).
- is familiar with social cause and effect processes as an object and is able to apply social science approaches and research methods.

In addition, the following applies to both bachelor groups:

The student:

- has, through theme-oriented studies, built up experience with multidisciplinary collaboration and the associated methodical and communicative problems and skills.
- has the basic academic skills for setting up a research plan, formulating a problem, gathering information, processing and interpreting data.
- is able to submit oral and written reports and to clarify, defend, and if required, adjust a scientifically based point of view.
- is experienced in and able to recognise and address the ethical aspects of an environmental issue, and can choose and defend an ethical position.

Incidentally, as a consequence of the increasing mobility of students between the bachelor and the master programmes, it is also important for academic environmental bachelor programmes that students have a sufficiently broad and generic level of academic knowledge and skills, in order to enable their inflow to other, non-environment-specific, master programmes if desired.

Master programmes in Environmental Sciences

As indicated above, mobility of students between bachelor and master programmes is on the rise. As a result, environmental programmes are increasingly faced with an inflow of students to the master programme, without having followed a 'logical' preliminary bachelor. The increasing division of bachelor and master implies that courses need to warrant both the final level as well as the entry level to the master. All environmental science programmes apply a number of general rules in this connection. For trained academics the following (mix of) conditions apply: a sufficient basic level in either the social or the natural sciences, sufficient analytical, methodical and research knowledge and skills, and – this does not apply to Flanders – a basic knowledge of issues regarding the environment and sustainability. For non-academics, in most cases in addition to the requirements noted above, a switch programme varying from 30 to 60 EC applies, with the possible requirement of a minimum average score and a letter of motivation or an introductory interview as a condition for entry. The objective of this is twofold: improving general scientific skills or competences, and upgrading basic scientific discipline (www.hogeronderwijsregister.be , 2011).

The competences of a master student on completion of their academic training in environmental sciences can be summarised as follows:

- is able to assess the relevance of environmental issues in the context of both the natural and the social sciences.
- is able to position environmental issues within the context of sustainable development.
- is able to carry out in-depth research and analysis of environmental issues, starting from a set of concepts, theories and research methods based on either the natural or the social sciences, or from a twofold approach.
- is able to independently set up an investigation into an environmental issue, to carry out this investigation, to report on the progress, and to formulate recommendations for further intervention and research.
- is able to make a profound contribution at an academic level to the transition to a sustainable society, on the basis of acquired substantive and methodical knowledge, skills in the field of the integration of knowledge, and reporting and advisory skills.
- is able to communicate both in a scientific and a non-scientific context about environmental issues and the way to deal with those issues, to assume scientifically sound points of view in that connection, and to argue those points of view.
- is able to critically reflect on environmental issues, the contribution of environmental scientists in that respect, and the associated questions of complexity and uncertainty.
- is trained to assume the role of an environmental professional, acting as a researcher, an advisor and/or an operative for academic, government or private (profit and non-profit) organizations.

References

Bakker, R. (2011), Tekort aan voldoende geschoold personeel op milieuwerkveld, Milieu, december 2011, p. 35.

Boersema J. and L. Reijnders (2009) (eds.), Principles of Environmental Sciences, Springer.

Broekhans, B. (2003), Hoe milieukunde geschiedenis werd – demarcatie van een maatschappelijk relevante wetenschap, 1970-2000, Nijmegen University Press.

Crutzen, P.J., The 'Anthropocene', Journal de Physique IV France, 12, 2002, 10-11-15.

Fortier, J.D., S.M. Grady, S.A, Lee, and P.A. Marinac (1998), Wisconsin's Model Academic Standards for Environmental Education, Madison.

Jamison, A. and P. Maarleveld (2001), Reforming Environmental Higher Education in Europe, Utrecht.
NAAEE (2000), Environmental Education Materials : Guidelines for Excellence Workbook, Rock Spring.
QAA (2007), Earth sciences, environmental sciences, environmental studies, Mansfield.
QAA (2010), Master degree characteristics, London.
QANU (2007), Milieuwetenschappen, Utrecht.
QANU (2008), Milieuwetenschappen - Appendix Wageningen Universiteit, Utrecht.
Researchinstituut voor Onderwijs en Arbeidsmarkt (ROA) (2011), Arbeidsmarktonderzoek 2012-2016, Den Haag.
Scholz, R.W. (2011), Environmental Literacy in Science and Society – From knowledge to decisions, Cambridge University Press.
Stern, P.C. (1993), A second environmental science: human-environment interactions, Science, 260 (5116), 1897-1899.
Udo de Haes, H.A. (1984), Milieukunde, begripsbepaling en afbakening, in J.J. Boersema et alii (red.), Basisboek Milieukunde, Meppel/Amsterdam, 17-30.
VLIR (2007), De onderwijsvisitatie Milieuwetenschappen, Een evaluatie van de kwaliteit van de masteropleidingen Milieuwetenschappen aan de Vlaamse universiteiten, Brussel.
VSNU (1996), Onderwijsvisitatie Milieukunde, Utrecht.
VSNU (2002), Onderwijsvisitatie Milieuwetenschappen, Utrecht.

Appendix 3: Intended learning outcomes

Bachelor Programme Environmental Sciences

The Environmental Sciences (MNW) programme aims to the:

- Achievement of basic knowledge, insight and skills in the broad domain of the environmental sciences and the achievement of the intended learning outcomes defined below;
- Development of general academic education. This comprises the development of competences (knowledge, skills and attitudes) regarding i) thinking, acting and communication on an academic level, ii) ability to handle the set of instruments relevant for scientific research, iii) scientific communication, and iv) application of specific knowledge pertaining to the domain in a wider scientific, philosophical and societal context.
- Preparation for further (study) career, in particular for the Sustainable Development Master programme, Energy and Resources track, the Sustainable Development Master programme, Global Change and Ecosystems track or the Master programme Water Science and Management.

A graduate from the MNW programme:	**Dublin descriptor**	**Referential framework**
1. Has knowledge of and insight into the environmental sciences, in particular: a. Knowledge of the nature, magnitude and causes of environmental problems, and of environmental scientific concepts to analyse, explain and solve environmental problems;	1	B.1, B.2, B.4
b. Knowledge of the opportunities and limitations of the various disciplines that are relevant in the analysis of environmental problems and the search for solutions;	1	B.1
c. Knowledge of the multidisciplinary character of the environmental sciences as a domain and the ability to identify the opportunities and limitations of multidisciplinary ambitions;	1	B.1
d. Knowledge of and competences for working in a multidisciplinary team, in particular the ability to confront and integrate insights and approaches from various environmental scientific disciplines within teams.	2	B.1, B.6
2. Has knowledge of and insight into the theoretical and methodological foundations of environmental sciences, in particular: a. Knowledge of the methodology of natural-scientific environmental research, in particular the competences to apply these methods in research aimed at the analysis of cause-effect relations and the spatial dimensions of environmental problems, as well as solution-oriented research;	1, 3	B.4, B.6
b. Knowledge of models to simulate and predict processes in environmental compartments and interactions between different environmental compartments, and the ability to apply these models;	1	B.1
c. Knowledge of the use of natural-scientific information in the design, implementation and evaluation of environmental governance strategies.	1	B.1, B.5
3. Has acquired general academic competences, as formulated in the aims of the programme and in particular regarding:	2	B.6

a. Working in a multidisciplinary team: the ability to confront and integrate insights and approaches from various environmental scientific disciplines within teams;	2	B.6
4. Is able to apply knowledge and insights in such a way that it demonstrates a professional approach of his or her work or profession;	2, 3	B.9
5. Is able to reformulate a practical question or problem related to the environmental studies into a clear and researchable problem statement; to operationalise associated concepts in an adequate way; to analyse a subject theoretically as well as empirically, in mutual connection; to present the results in a coherent discourse that concludes with a clear and synthesising conclusion; to use the results for answering the practical question or to contribute to the clarification and if possible the resolution of the problem; to develop an position that is partly based on balancing relevant societal, scientific or ethical aspects;	2, 3	B.7
6. Is able to communicate information, ideas and solutions to an audience of specialists and non-specialists, both orally and in text;	4	B.7
7. Has the study competences for starting a Master degree programme.	5	

Bachelor programme Environmental Studies

The MMW programme aims to the:

- Achievement of basic knowledge, insight and skills in the broad domain of the environmental studies and the achievement of the intended learning outcomes defined below;
- Development of general academic education. This comprises the development of competences (knowledge, skills and attitudes) regarding i) thinking, acting and communication on an academic level, ii) ability to handle the set of instruments relevant for scientific research, iii) scientific communication, and iv) application of specific knowledge pertaining to the domain in a wider scientific, philosophical and societal context.
- Preparation for further (study) career, in particular for the Sustainable Development Master programme, Environmental Governance track or the International Development track.

Intended learning outcomes MMW A graduate from the MMW programme:	**Dublin descriptor[a]**	**Referential framework (App. 2)[b]**
8. Has knowledge of and insight into the environmental sciences, in particular: e. Knowledge of the nature, magnitude and (societal) causes of environmental problems, i.e. the ability to analyse and explain society-environment relationships at various levels;	1	B.1, B.2, B.4
f. Knowledge of the opportunities and limitations of the various disciplines that are relevant in the analysis of environmental problems and the search for solutions;	1	B.1
g. Knowledge of the multidisciplinary character of the environmental sciences as a domain and the ability to identify the opportunities and limitations of multidisciplinary ambitions;	1	B.1

h. Knowledge of and competences for working in a multidisciplinary team, in particular the ability to confront and integrate insights and approaches from various environmental scientific disciplines within teams.	2	B.1, B.6
9. Has knowledge of and insight into the theoretical and methodological foundations of environmental studies, in particular: d. Knowledge of the methodology of social-scientific environmental research, in particular the competences to design a social-scientific environmental research and to make well-argued choices for quantitative and/or qualitative methods for the execution of a social-scientific environmental research;	1, 3	B.4, B.6
e. Knowledge of the societal responses to environmental problems (environmental awareness, environmental movement and environmental policy) and the way in which these have been studied by social scientists;	1	B.1
f. Knowledge of the paradigms, problem definitions and empirical domains associated with the social sciences, in particular the policy sciences, the spatial sciences and/or the innovation sciences;	1	B.1, B.5
g. Insight into the complex processes of societal change associated with the strive for a sustainable society and the ability to distinguish, characterise and evaluate the effectiveness of the variety of governance strategies;	1	B.2
10. Has acquired general academic competences, as formulated in the aims of the programme and in particular regarding:	2	B.6
b. Working in a multidisciplinary team: the ability to confront and integrate insights and approaches from various environmental scientific disciplines within teams;	2	B.6
c. Project management, discussion and negotiation.	2	B.6
11. Is able to apply knowledge and insights in such a way that it demonstrates a professional approach of his or her work or profession;	2, 3	B.9
12. Is able to reformulate a practical question or problem related to the environmental studies into a clear and researchable problem statement; to operationalise associated concepts in an adequate way; to analyse a subject theoretically as well as empirically in a consistent way; to present the results in a coherent discourse that concludes with a clear and synthesising conclusion; to use the results for answering the practical question or to contribute to the clarification and if possible the resolution of the problem; to develop an position that is partly based on balancing relevant societal, scientific or ethical aspects;	2, 3	B.7
13. Is able to communicate social-scientific information, ideas and solutions regarding complex processes of societal change to an audience of specialists and non-specialists, both orally and in text;	4	B.7
14. Has the study competences for starting a Master degree programme.	5	

Master programme Environmental Sciences

Intended Learning Outcomes	Dublin descriptors	ICM 2012
Once completed the Master degree programme in Environmental Sciences, the student…	Master degrees are awarded to students who …	
A1 has advanced knowledge and understanding of the field of Environmental Sciences in its societal context;	A. Knowledge and insight … have demonstrated knowledge and understanding that is founded upon and extends and/or enhances that typically associated with Bachelor level, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context	M.1 M.3
B1 has the ability to apply knowledge and research methods, and problem-solving abilities in broader contexts related to the field of Environmental Sciences;	B. Application of knowledge and insight … can apply their knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study	M.2
B2 is able to conduct research in the field of Environmental Sciences in a creative and independent way;		M.4
C1 has professional and academic skills, in particular related to Environmental Sciences;	C. Judgement … have the ability to integrate knowledge and handle complexity, and formulate judgements with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgements	M.2
C2 is able to apply knowledge and understanding in such a way that he or she demonstrates a professional approach to their work;		M.7
D1 is able to communicate conclusions, as well as the knowledge, reasons and considerations underlying these conclusions, to an audience of specialists and non-specialists	D. Communication … can communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously	M.5 M.6 M.8
E1 is able to study and work independently and in a self-reflective way while exploring new areas of interest in the field of the programme or related fields	E. Learning skills … have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous	M.3

The intended learning outcomes of the Master programme Environmental Sciences are further specified for the specialisation programmes Sustainable Development and Water,

Science and Management and their application fields tracks. The specified learning outcomes are listed below.

Intended learning outcomes specialisation programme Sustainable Development Once completed the programme, the student…	**Related to intended learning outcome Master degree Programme Environmental Sciences**
1. is able to analyse the issue of sustainable development from a natural science and social science perspective; 2. has the ability to apply knowledge and research methods, and problem-solving abilities in broader contexts related to sustainable development; 3. is able to design and carry out natural scientific or social scientific research on the issue of sustainable development in a creative and independent way; 4. can formulate fundamental critique on the scientific work of others and can engage in a scientific debate on the issue of sustainable development, based on specialised and broader academic knowledge as well as ethical considerations; 5. is able to apply and knowledge and understanding in such a way that he or she demonstrates a professional approach to their work; 6. is able to communicate conclusions, as well as the knowledge, reasons and considerations underlying these conclusions, to an audience of specialists and non-specialists.	A1 B1 B2 C1 C2 D1
Sustainable Development, track Energy and resources	
1. has advanced (natural science based) knowledge of how society uses and produces energy and materials and of the consequences for people, the economy, the environment, and future generations; 2. can approach issues of energy and materials from an interdisciplinary angle, applying elements of natural science, social science, and economics; 3. is able to design and conduct independent research on energy and material systems on various scales (micro, regional, national, and international) in a creative and independent way ; 4. is able to propose, design and assess solutions to make energy and material systems sustainable, while applying knowledge from natural science, social science, and economics.	A1 B1 B2 B1
Sustainable Development, track Global Change and Ecosystems	
1. has advanced knowledge of processes determining the interrelations between human activities (such as land use and burning fossil fuels), environment and ecosystems; 2. has insight in recent theories and developments in scientific research concerning environmental and ecosystem changes caused by humans; 3. has the ability to apply important research methods, including methods to investigate effects of human activities on environment and ecosystems, to model processes in ecosystems, and to evaluate the sustainability of scenarios for future human activities in an independent and creative; 4. is able to propose, design and assess solutions and scenarios to improve sustainability of future human activities.	A1 A1 B1 B1
Sustainable Development, track Environmental Governance	
1. has advanced knowledge of sustainability issues as social, economic, cultural, and political processes, including issues such as the	A1

internationalisation of politics and the economy, the changing relations between the state, the market, and civil society, the unequal distribution of wealth;	
2. is able to integrate insights and approaches drawn from different social science disciplines within the framework of analysis of sustainability issues and the analysis of various modes of governance for sustainable development;	A1
3. is able to develop and carry out scientific research on formulation and implementation of public and private policies and strategies for sustainable development (targeted towards social change at the micro, meso and macro level), applying various criteria derived from environmental, social and policy science (such as efficiency, effectiveness, equity, legitimacy); in an independent and creative way;	B1 B1
4. is able to propose, design and assess solutions and policy strategies for intervention to promote sustainable development.	
Sustainable Development, track International Development	
1. has advanced knowledge of issues of international development with a focus on the promotion of sustainable livelihoods in developing and transition countries, within their dynamic social, cultural, economic and geographical contexts and is able to integrate these insights in the analysis of sustainability and development issues	A1 B1
2. is able to understand and integrate insights and approaches current academic theories of international development in developing and transition countries, and contribute to ongoing debates on these issues at an academic level;	B2
3. is able to develop and carry out scientific research and policy analysis pertaining to international development issues in developing and transition regions, in an independent, creative and effective way	B1
4. is able to propose, design and assess solutions and policies for intervention to promote sustainable livelihoods in developing and transition countries.	

Intended learning outcomes specialisation programme Water Science and Management Once completed the programme, the student…	**Related to intended learning outcome Master degree Programme Environmental Sciences**
1. analyse technical and societal issues, and the relations between them, relevant to contemporary and future water management aimed at sustainable development;	A1
2. understand, and perform basic calculations on, natural and technical processes related to water quantity and water quality issues;	B1
3. design, carry out and report on scientific research on the issue of water management in a creative and independent way;	B2
4. engage in a scientific, social and administrative debate on the issue of water management;	C1, C2
5. communicate on the issue of water management verbally and in writing to a wide audience of water specialists and non-specialists alike.	D1

Appendix 4: Overview of the curriculum

Bachelor programme Environmental Sciences (2011-2012)

Mandatory courses- major- 75 EC		
Name (dutch)	**Name (English)**	**Size/Level**
Grondslagen van de Milieuwetenschappen	Foundations of environmental sciences and studies	7.5 EC level 1
Duurzame Ontwikkeling	Sustainable development	7.5 EC level 1
Wiskunde en Systeemanalyse	Mathematics and system analysis	7.5 EC level 1
Onderzoeksvaardigheden 1 Milieuwetenschappen	Research skills 1 Environmental sciences and studies	7.5 EC level 1
Processen in Milieucompartimenten	Processes in the environmental compartments	15 EC level 1
Milieubeleid in (inter)Nationale context -	Environmental policy in (inter)national context	7.5 EC level 2
	Global Climate Change	7.5 EC level 2
Onderzoeksvaardigheden 2 IMW	Research skills 2 innovation and environmental sciences and studies	7.5 EC level 2
Milieuwetenschappelijk Adviesproject	Environmental Consultancy Project	7.5 EC level 3

Major elective courses 60 EC		
Name (dutch)	**Name (English)**	**Size/Level**
Choice 1 out of 2		7.5 EC level 1
Chemie van Systeem Aarde	Chemistry of Earth Systems	
Natuurkunde voor Energie en Transport	Physics for energy and transport	
Choice 2 out of 4		15 EC level 2
De Microscoop en de Olifant	The Microscope and the Elephant	
	Environmental Impact Assessment	
Milieu, Gedrag en Communicatie	Environment, behaviour and communication	
Toegepaste Thermodynamica en Energieconversies	Applied thermodynamics and energy conversions	
Choice 4 out of 7		30 EC Level 3
	Ecohydrology	
Integraal Water- en Bodembeheer	Integrated water- and soil management	
Landschapsecologie en Natuurbeheer	Landscape ecology and nature management	
Milieutoxicologie	Environmental toxicology	
	Energy analysis	
	Business, Sustainability and Innovation	
Uitbreiding Bachelor thesis	Extension Bachelor thesis	
Choice 1 out of 3		7.5 EC Level 3

Bachelor thesis Water- en Natuurbeheer	Bachelor thesis – Water and Nature	
Bachelor thesis Energie- en Grondstoffenbeheer	Bachelor thesis – Energy and Resources	
Bachelor thesis vrije keuze	Bachelor thesis – Free choice	

Bachelor programme Environmental Studies (2011-2012)

Mandatory courses- major- 75 EC		
Name (dutch)	**Name (English)**	**Size/Level**
Grondslagen van de Milieuwetenschappen	Foundations of environmental sciences and studies	7.5 EC level 1
Duurzame Ontwikkeling	Sustainable development	7.5 EC level 1
Inleiding Openbaar Bestuur/Bestuursrecht	Introduction to public administration and administrative law	7.5 EC level 1
Onderzoeksvaardigheden 1 Milieuwetenschappen	Research skills 1 Environmental sciences and studies	7.5 EC level 1
Micro-economie van Innovatie	Micro economics of innovation	7.5 EC level 1
Milieubeleid in (inter)Nationale context	Environmental policy in (inter)national context	7.5 EC level 2
Evaluatie en Ontwerp van Milieubeleid	Evaluation and design of environmental policy	7.5 EC level 2
Onderzoeksvaardigheden 2 IMW	Research skills 2 innovation and environmental sciences and studies	7.5 EC level 2
Milieurecht	Environmental law	7.5 EC level 3
Milieuwetenschappelijk Adviesproject	Environmental Consultancy Project	7.5 EC level 3
Elective courses – 60 EC		
Choice 1 out of 3		7.5 EC level 1
Inleiding Planologie	Introduction to Spatial Planning	
Inleiding Sociale Geografie	Introduction to Social Geography	
Introductie Technologie en Innovatie	Introduction to Technology and Innovation	
Choice 3 out of 4		22.5 EC level 2
	Environmental Economics	
Sociologie en Milieu	Sociology and the environment	
De Microscoop en de Olifant	The Microscope and the Elephant	
	Environmental Impact Assessment	
Choice 3 out of 5		22.5 EC level 3
	Life Cycle Assessment	
Duurzaam Ruimtegebruik	Sustainable land use	
	Business, sustainability and innovation	
Omgevingsrecht	Spatial law	
Uitbreiding Bachelor thesis	Extension Bachelor thesis	
Choice 1 out of 3		7.5 EC level 3

Bachelor thesis Duurzaam Ondernemen	Bachelor thesis – Sustainable entrepreneurship	
Bachelor thesis Duurzaam Ruimtegebruik	Bachelor thesis – Sustainable land use	
Bachelor thesis vrije keuze	Bachelor thesis – Free choice	

Master programme Environmental Sciences (2011 – 2012)

	EC	Year
Integrated common courses		
Sustainable Development: integrating perspectives	7.5	1
Sustainability Science: modelling and indicators	7.5	1
Transdisciplinary Case Study	7.5	2
Track Energy and Resources		
Introduction to the Energy and Resource System	7.5	1
Sustainable Energy Supply & Solutions	7.5	1
Energy & Resource Efficiency	7.5	1
Fossil Resources: past, present and future	7.5	1
Energy Policy and Transitions	7.5	1
Climate Systems and Adaptation	7.5	1
Elective	7.5	2
Master thesis	30	2
Extension Thesis / Publishing your Research)/ Individual research project/Extra optional courses	15	2
Track Global Change and Ecosystems		
Themes in Global Change and Ecosystems	7,5	1
Ecosystem Modelling	7,5	1
Research in GCE	22,5	1
Climate Systems and Adaptation	7.5	1
Elective	7.5	2
Master thesis	30	2
Extension Thesis / Publishing your Research)/ Individual research project/Extra optional courses	15	2
Track Environmental Governance		
Governance for SD: Theories	7,5	1
Policy Analysis	7,5	1
International Environmental Governance	7,5	1
Governance for SD: Practices	7,5	1
Research Design EG	7,5	1
Advanced Research Methods EG	7,5	1
Elective	7.5	2
Master thesis	30	2
Extension Thesis / Publishing your Research)/ Individual research project/Extra optional courses	15	2
Track International Development		
Development Themes	7,5	1
Advanced Methods & Techniques Development Studies	7,5	1
Internship IDS	30	1
Development Theories	7,5	2
Master thesis	30	2
Extension Thesis / Publishing your Research)/ Individual research project/Extra optional courses	15	2

Appendix 5: Quantitative data regarding the programme

Data on intake, transfers and graduates

Bachelor programme Environmental Sciences (MNW)

Intake and transfer pertaining to the last seven cohorts

	Intake			Transfer (enrolled next year)	
Cohort	**Male**	**Female**	**Total**	**#**	**%**
2006-07	12	9	21	15	71%
2007-08	22	15	37	31	84%
2008-09	22	13	35	24	69%
2009-10	18	11	29	22	76%
2010-11	11	7	18	16	89%
2011-12	14	9	23	18	78%
2012-13	12	8	20	16	80%
2013-14	22	13	35		

Binding Study Advise (BSA) pertaining to the last six cohorts

Cohort	Positive	Negative	Stopped before February	Advise adjourned	No advise	Total
2007-08	30	3		4		37
2008-09	24	6		5		35
2009-10	24	3	1		1	29
2010-11	17	1				18
2011-12	18	2	3			23
2012-13	16	2	2			20

Data on the efficacy (cumulative percentage of graduates) pertaining to the last seven cohorts

Cohort	Transfer to 2nd year	Total # graduates	After 3 years	After 4 years	After 5 years	After 6 years	Still active
2006	18	18	56%	89%	100%	100%	0%
2007	31	27	35%	81%	87%		0%
2008	24	23	46%	83%	96%		0%
2009	22	21	41%	95%			5%
2010	16	3	19%				81%
2011	18	0					100%

Bachelor programme Environmental Studies (MMW)

Intake and transfer pertaining to the last seven cohorts

	Intake			Transfer (enrolled next year)		
Cohort	**Male**	**Female**	**Total**	**#**	*%*	
2006-07	9	15	24	21	*88%*	
2007-08	20	17	37	24	*65%*	
2008-09	16	16	32	17	*53%*	
2009-10	22	33	55	42	*76%*	
2010-11	26	18	44	25	*57%*	
2011-12	18	15	33	17	*52%*	
2012-13	12	19	31	21	*68%*	
2013-14	23	16	39			

Binding Study Advise (BSA) pertaining to the last six cohorts

Cohort	Positive	Negative	Stopped before February	Advise adjourned	Started in February	No advise	Total
2007-08	23	4		10			37
2008-09	16	12		4			32
2009-10	41	5	4	1		4	55
2010-11	24	7	12	1			44
2011-12	17	12	4				33
2012-13	21	7	3				31

Data on the efficacy (cumulative percentage of graduates) pertaining to the last seven cohorts

Cohort	Transfer to 2nd year	Total # graduates	After 3 years	After 4 years	After 5 years	After 6 years	Still active
2006	21	20	24%	76%	86%	95%	0%
2007	24	21	33%	75%	83%	88%	8%
2008	17	12	18%	53%	71%		6%
2009	42	26	21%	62%			38%
2010	25	4	16%				84%
2011	17	0					100%

Master programme Environmental Sciences

Registered first-year students

Academic year	Total inflow	Start September	Start February	% female
06/07	45	39	6	31
07/08	77	62	15	49
08/09	46	37	9	50
09/10	68	55	13	49
10/11	105	92	13	51
11/12	101	95	6	51
12/13*	54	54	n/a	45

*Including inflow Water Science and Management, Environmental Sciences variant

BSc programmes completed by inflowing Environmental Sciences students

Cohort	Total inflow	BSc MNW UU	BSc MMW UU	Other UU	Other Dutch universities	HBO	Foreign universities
06/07	45	3	3	16	3	8	12
07/08	77	11	4	28	8	3	23
08/09	46	3	1	10	11	3	18
09/10	68	3	1	18	13	1	32
10/11	105	10	4	24	20	3	44
11/12	101	14	5	20	19	5	38
12/13*	54	6	2	15	8	2	21

*Including inflow Water Science and Management, Environmental Sciences variant

Data on the efficacy of the programme (graduates) pertaining to the last seven cohorts

Cohort	Cohort size	13-24 months	25-36 months	37-48 months	>48 months	Still active	Early exits
2006	45	24%	53%	71%	71%	0%	29%
2007	77	23%	68%	78%	81%	1%	18%
2008	46	30%	82%	84%		2%	14%
2009	68	16%	69%			14%	17%
2010	105	31%				61%	8%
2011	101					95%	5%
2012*	54					100%	0%

*Including inflow Water Science and Management, Environmental Sciences variant, inflow for February 2013 not yet known.

Student staff ratio

Bachelor programme Environmental Sciences

	IEES staff (fte)	External staff (fte)	PhD students (fte)	Student assistants (fte)	Total teaching staff (fte)	Number of registered students	Student-staff ratio achieved
2010-2011	4.11	1.03	0.14	0.46	5.74	82	14.29
2011-2012	4.23	0.87	0.15	0.39	5.64	75	13.30

[1] Data are based on a 'teacher-course allocation table' that is constructed every year and shows the precise involvement of each staff member in each of the MNW courses. The number of registered students is retrieved from the Osiris student database (number of students per year, active code 4). Calculation for regular staff was with the hours summated of the major courses MNW with the staff from the sections IW, MNW and MMW.

Bachelor programme Environmental Studies

	IEES staff (fte)	External staff (fte)	PhD students (fte)	Student assistants (fte)	Total teaching staff (fte)	Number of registered students	Student-staff ratio achieved
2010-2011	3.85	0.46	0.10	0.17	4.58	128	27.95
2011-2012	4.00	0.46	0.13	0.13	4.72	116	24.58

* Data are based on a 'teacher-course allocation table' that is constructed every year and shows the precise involvement of each staff member in each of the MMW courses. The number of registered students is retrieved from the Osiris student database (number of students per year, active code 4). The teacher-student ratio is fairly stable over time; between 2002 and 2005 it was on average 26.7 (source: self-evaluation report prepared for the 2007 visitation).

Master programme Environmental Sciences

	Regular staff (fte)	PhD students (fte)	Student assistants (fte)	External staff (fte)	Total teaching staff (fte)	Number of registered students	Student-staff ratio achieved
2010-2011	3.47	0.07	0.05	0.88	4.47	215	48.09
2011-2012	5.31	0.20	0.00	0.99	6.50	250	38.46

Average face-to-face hours per phase of programme

Bachelor programme Enivronmental Sciences

	Total face-to-face hours scheduled	EC (major courses)	Hours (major courses)	Percentage of face-to-face hours in major courses	Average number face-to-face hours per weekb
Bachelor-1	455	52.5	1470	31%	13.0
Bachelor-2	382	37.5	1050	36%	15.1
Bachelor-3a	349	45	1260	28%	11.8

[a] including the scheduled seven hours face-to-face contact for supervision of Bachelor thesis
[b] based on 10 weeks scheduled activities per course
* Data taken from course schedules 2011-2012. The hours mentioned relate to scheduled major mandatory and major optional MNW courses. Students also take 45 EC in non-major optional courses (over the three-year programme). These optional courses are not included in the numbers.

Bachelor programme Enivronmental Studies

	Total face-to-face hours scheduled	EC (major courses)	Hours (major courses)	Percentage of face-to-face hours in major courses	Average number face-to-face hours per weekb
Bachelor-1	385	45	1260	31%	13.0
Bachelor-2	334	52.5	1470	23%	9.7
Bachelor-3a	221	37.5	1050	21%	8.8

Data taken from course schedules 2011-2012. The hours mentioned relate to scheduled major mandatory and major optional MMW courses. Students also take 45 EC in non-major optional courses (over the three-year programme). These optional courses are not included in the numbers. The percentage of face-to-face hours in major courses in the MMW programme is comparable to those in the other bachelor programmes organised by the Teaching Institute of Innovation, Environmental and Energy Sciences.

Master programme Enivronmental Sciences

Lectures	Tutorial / computer practicals	Feedback / consult	Exam	Total contact hours	% contact of total hours / course (210)
27.6	25.6	0.5	1.8	55.5	26.4

Source: class schedules posted on the website and course manuals

Appendix 6: Programme of the site visit

Thursday 26 September

9:00 – 11.30	Preparatory meeting reviewing documents	
11:30 – 12:30	Management of the programme	• Dr. Margien Bootsma (Director of Education), • Dr. Aat Barendregt (programmeleader BSc MNW), • Dr. Hens Runhaar (programmeleader BSc MMW), • Dr. Walter Vermeulen (programmeleader MSc ES-SUSD), • Dr. Paul Schot (programmeleader MSc ES-WSM).
12:30 – 13:15	Lunch	
13:15– 14:00	Students Ba MNW	• Birte Nieuwenhuijse, • Ewa van Kooten, • Daniël Ouddeken, • Cintha Kemp, • Farilde Steur, • Ed Beije
14:00 – 14:45	Lectures Ba MNW	• Dr. Karin Rebel, • Dr. Jerry van Dijk, • Prof. dr. Jack Middelburg, • Dr. Maarten Eppinga, • Dr. Paul Schot, • Dr. ir. Chiel Jonker
14:45-15:00	Break	
15:00 -15:45	Students Ba MMW	• Saskia Kocks, • Julia Stuijfzand, • Anne Schipper, • Marleen Poot, • Koen van Oostende, • Moniek van der Linde
15:45 – 16:30	Lectures Ba MMW	• Dr. Frank van Laerhoven, • Dr. Walter Vermeulen, • Clare Barnes MSc, • Dr. Eva Niesten, • Dr. Carel Dieperink, • Mr. Barbara Beijen
16:30 – 16:45	Break	
16:45 – 17:30	Alumni	• Sacha Handgraaf BSc, • Daan Henkens BSc, • Duif Kraamwinkel BSc, • Cees Dekker MSc, • Iris Pit MSc

17:30 – 18:00	Study advisor	• Monica Gorska

Friday 27 September

9:00 – 9:45	Students Ma ES	• Myrna de Hoop BSc, • Ioannis Repapis BSc, • Alexandros Moulopoulos BSc, • Lea Eggers BSc, • Dennis Steinsiek BSc, • Lieke Coppens BSc
9:45 – 10:30	Board of Examiners	• Prof. dr. Peter Driessen (Chairman Board of Examiners IMEW and Faculty of Geosciences), • Dr. Floortje Alkemade (Member Board of Examiners IMEW and chairperson Assessment Committee), • Dr. Stefan Dekker (Member Board of Examiners IMEW), • Dr. Evert Nieuwlaar (Member Board of Examiners IMEW)
10:30 -10:45	Break	
10:45 – 11:30	Education Committee	• Dr. Floris van den Berg (Member BSc education committee), • Jelle Zalm BSc (Chairman BSc education committee), • Matthijs Bouwmans (Member BSc education committee), • Cameron Lockhart BA (Member MSc education committee), • Lieke Helsper BSc (Chairperson MSc education committee)
11:30 -12:15	Lectures Ma ES	• Prof. dr. ir. Max Rietkerk, • Dr. Carel Dieperink, • Dr. Guus van Westen, • Prof. dr. Bert de Vries, • Dr. ir. Wina Graus
12:15 -13:00	Lunch	
13:00 -13:45	Preparing for the final meeting	
13:45 – 14:45	Final meeting with the management	• Prof. dr. Ronald van Kempen (Dean), • Prof. dr. Piet Hoekstra (vice-dean), • Dr. Margien Bootsma (Director of Education), • Dr. Aat Barendregt (programmeleader BSc MNW), • Dr. Hens Runhaar (programmeleader BSc MMW), • Dr. Walter Vermeulen (programmeleader MSc ES-SUSD), • Dr. Paul Schot (programmeleader MSc ES-WSM).
14:45 -17:00	Committee meeting	

	(drafting conclusions)	
17:00 –17:15	Oral presentation by the chairman	
17:15	Drinks and end of visit	

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:

Bachelor programme Environmental Sciences

Student Number	Year	Final Grade
3287084	2010-11	8.5
3502732	2011-12	7.5
3404609	2010-11	7.1
3361233	2010-11	8.3
3548317	2011-12	8.5
3407802	2011-12	6.2
3399931	2010-11	7.5
3510360	2011-12	6.0
3346129	2010-11	6.3
3496791	2011-12	8.4

Bachelor programme Environmental Studies

Student Number	Year	Final Grade
3476723	2011-2012	8.0
3399958	2011-2012	6.0
3219453	2010-2011	8.5
3125262	2010-2011	6.0
3245527	2010-2011	9.0
3351947	2011-2012	7.5
0425273	2011-2012	8.3
3496449	2011-2012	7.8
3226808	2010-2011	5.8
3507467	2011-2012	7.8

Master programme Environmental Sciences

Student Number	Year	Specialization	Final Grade
3017990	2011	ID	8.6
3538036	2012	EG	6
3021920	2011	EG	8.8
0436267	2011	EG	6.5
3021750	2012	GCE	7.1
0458473	2011	GCE	7.7
3553108	2011	EG	7.5
3134857	2011	EG	8.6
3540340	2012	ER	7.6
3607682	2012	EG	6.1

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

- forms used for assessing the theses;
- materials and publications used for information and marketing purposes;
- learning materials: handbooks, readers, collections of articles, etc.;
- examples of papers, reports and internship reports produced by students;
- rules and regulations for writing theses, reports, research papers;
- rules and regulations applying to internships;
- exam regulations;
- written exams and assessment materials;
- recent minutes and reports of meetings of the Board of Studies, the Board of Examiners, annual reports on education;
- reports of evaluations of courses and curricula;
- results of surveys among graduates;
- policy reports and documents relating to the degree programmes

Appendix 8: Declarations of independence

nvao
nederlands - vlaamse accreditatieorganisatie

DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: WA HAFKAMP

HOME ADDRESS:

STADE DE COLOMBES 55
1098 VS AMSTERDAM

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

ENVIRONMENTAL SCIENCES

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

QANU

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

nvao
nederlands-vlaamse accreditatieorganisatie

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

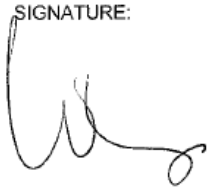
CERTIFIES TO OBSERVING STRICT CONFIDENTIALITY WITH REGARD TO ALL THAT HAS COME AND WILL COME TO HIS/HER NOTICE IN CONNECTION WITH THE ASSESSMENT, INSOFAR AS SUCH CONFIDENTIALITY CAN REASONABLY BE CLAIMED BY THE PROGRAMME, THE INSTITUTION OR NVAO;

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

PLACE: UTRECHT

DATE: 25 March 2013

SIGNATURE:



nvao
nederlands - vlaamse accreditatieorganisatie

DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: Ivan Janssens

HOME ADDRESS:

JACOBSLAAN 122

2380 ZOERSEL, BELGIUM

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

ENVIRONMENTAL SCIENCES

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

QANU

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

nvao
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: Antwerpen DATE: 20/3/2013

SIGNATURE:

nvao
nederlands-vlaamse accreditatieorganisatie

DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: ANDREW JAMISON

HOME ADDRESS: KABBARPSVÄGEN 25
S-232 52 ÅKARP
SWEDEN

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

Environmental Sciences

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

QANU

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

nvao
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: Utrecht

DATE: 25/03-2013

SIGNATURE:

nvao
nederlands - vlaamse accreditatieorganisatie

DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: LOOTS ILSE

HOME ADDRESS: KAPELLELEI 36
B-2610 MORTSEL
BELGIË

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

ENVIRONMENTAL SCIENCES

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

QANU

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

nvao
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: ANTWERPEN DATE: 20.3.2013

SIGNATURE:

nvao
nederlands-vlaamse accreditatieorganisatie

DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: Lieke van der Sanden

HOME ADDRESS: Pegasusplaats 103-3
6525 JJ Nijmegen

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

environmental sciences
RUG, Wageningen University, UMCU, Utrecht University

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

QANU
~~Radboud University Nijmegen~~

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

nvao
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: Utrecht

DATE: 25-03-2013

SIGNATURE:

nvao
nederlands - vlaamse accreditatieorganisatie

DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: Esther Poort

HOME ADDRESS:

Laan van Alberlshoeve 130
1902 PS Culemborg

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

Environmental sciences.

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

QANU

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

nvao
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: Utrecht DATE: 25-3-2013.

SIGNATURE: