

**Environmental Sciences,
Urban Environmental
Management**

Wageningen 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

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This report was finalised on 7 October 2013.

Report on the bachelor and master programme Environmental Sciences and the master programme Urban Environmental Management of Wageningen University

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

Administrative data regarding the programme

Bachelor of science programme Environmental Sciences

Name of the programme:	Environmental Sciences
CROHO number:	56283
Level of the programme:	bachelor
Orientation of the programme:	academic
Number of credits:	180 EC
Specializations or tracks:	Environmental Policy and Economics, Environmental Quality and Systems Analysis, Environmental Technology
Location(s):	Wageningen
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:	Air Quality and Atmospheric Chemistry, Aquatic Ecology and Water Quality Management, Environmental Economics and Natural Resources, Environmental Policy, Environmental Systems Analysis, Environmental Technology, Integrated Water Management, Soil Biology and Biological Soil Quality, Soil Chemistry and Chemical Soil Quality, Toxicology.
Location(s):	Wageningen
Mode(s) of study:	fulltime
Expiration of accreditation:	31-12-2014

Master of Science programme Urban Environmental Management

Name of the programme:	Urban Environmental Management
CROHO number:	60110
Level of the programme:	master
Orientation of the programme:	academic
Number of credits:	120 EC
Specializations or tracks:	Environmental Economics and Natural Resources, Environmental Policy, Environmental Systems Analysis, Environmental Technology, Geo-information Science and Remote Sensing, Land Use Planning, Management Studies
Location(s):	Wageningen
Mode(s) of study:	fulltime
Expiration of accreditation:	31-12-2014

The visit of the assessment committee Environmental Sciences to the Wageningen University took place on 22 and 23 May 2013.

Administrative data regarding the institution

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

Quantitative data regarding the programme

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

Composition of the assessment committee

The committee that assessed the bachelor Environmental Sciences, the master Environmental Sciences and the master Urban Environmental Management consisted of:

- Prof. W.A. Hafkamp, Chair, Professor in Environmental Economics, Erasmus University Rotterdam;
- Prof. I. Janssens, Research Professor at the University of Antwerp, affiliated to the research group of Plant and Vegetation Ecology;
- Prof. A. Jamison, Professor in Technology, Environment and Society, Aalborg University, Denmark;
- Prof J. Monstadt, Professor in Spatial and Infrastructure Planning, Darmstadt University of Technology, Germany;
- Mrs. L.H.A. van der Sanden, Master Student in Social and Political Sciences of the Environment, Radboud University Nijmegen.

The committee was supported by Dr. A. Venemans-Jellema, 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 and master programme in Environmental Sciences and the master programme in Urban Environmental Management of Wageningen University is part of a cluster assessment of eleven Environmental Sciences degree programmes offered by six universities.

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 their 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 actual context form the starting point for the evaluation of the quality of the degree programmes.

In preparation for the assessment of the programmes, a self-assessment report (critical reflection) was prepared by the programme management. This critical reflection 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 (thirty theses in total) out of 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 (9-9.5). 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 thesis was assessed as questionable or unsatisfactory by a committee member, a reassessment was done by another committee member. If more than 10% of the theses were assessed as questionable or unsatisfactory by two committee members, the selection of theses for the programme was extended to 20. In Wageningen this was not the case.

Site visit

The committee members formulated questions raised by studying the critical reflection in advance. These questions were circulated among the committee prior to the site visit.

The committee visited the programmes in Wageningen on 22-23 May 2013. The first day started with a preparatory meeting. The programme of the site visit was developed by the committee's secretary in consultation with the chair and the programme management. The committee interviewed students, teachers and alumni, the programme management and representatives of the Board of the Education Institute, the Board of Examiners and the student and teacher members of the Programme committee. An open office hour was scheduled and announced (but not used).

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 last hours of the site visit were used by the committee to discuss the member's assessments of the programme and to prepare the presentation of the findings to the representatives of the programme.

Report

The secretary wrote a draft report based on the committee's findings. The draft report has been amended and detailed by the committee members. After approval of the draft report by the committee, it was sent to Wageningen University for a check of any factual errors. The comments by Wageningen University 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 Organisation of the Netherlands and Flanders) framework for limited programme assessment (as of 20 November 2011).

In the frameworks, a four-point scale is prescribed. The committee used the following definitions for the assessment of the standards, the programme as a whole, the standards and criteria on internationalisation, and the overall assessment on internationalisation.

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'.

Summary judgement regarding the bachelor programme Environmental Sciences

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

Standard 1: Intended learning outcomes

The domain of Environmental Sciences and initiatives towards establishing international benchmarks are described in the Dutch-Flemish referential framework for academic environmental education. The committee confirms that the framework is a solid basis for programmes in this discipline. It concluded that the learning outcomes of the framework were really well articulated.

The bachelor programme aims at developing an interdisciplinary attitude in its students that is conducive to an integrated approach of environmental and sustainability issues, i.e., problems caused by the interaction of human systems and Earth systems. It also aims at educating bachelor students who – proceeding from an interdisciplinary approach – are able to develop technology, socio-political arrangements or economic instruments to control or avoid environmental problems. The committee finds that there is a clear description of the objectives. It appreciates that the programme approaches the field of environmental sciences from a very broad perspective. However, the learning outcomes of the programme could have been formulated better.

As there are no employment opportunities for graduates of the bachelor programme within the domain, the programme focuses on preparing students for an academic master programme. The committee finds that the programme equips students well to participate successfully in postgraduate training programmes.

Standard 2: Teaching-learning environment

The three-year bachelor programme in Environmental Sciences consists of general foundation courses, domain-related courses, integrating domain-related courses, international study visits, major-specific courses, thesis and free choice. It is well-structured, interdisciplinary and quite broad. A criticism by the committee regarding the curriculum is the lack of sufficient skills training. All learning skills are integrated in the domain-specific courses. The committee recommends teaching different skills more explicitly. Although the programme has several courses that focus on the integration of different disciplines, the committee finds that the coherence between courses could be improved.

Wageningen University aims to offer programmes with an interdisciplinary approach. This was evident at the course level, but not as much at the programme level. However, the committee had difficulty identifying this educational philosophy as a specific didactical concept. It advises formulating an overarching concept on the programme level. The programme offers teaching methods that can be clustered into lectures, tutorials, practical training, group work, individual papers, and field trips. The committee is impressed by the variety of teaching methods.

All professors involved in the programmes (chair holders, personal, associate, assistant and special professors) have a PhD degree and are involved in the current research activities of the departments. In addition, designated researchers and lecturers are involved in the

programmes. The committee recognises the staff's scientific quality, national and international academic reputation and teaching experience. However, it has noted that the number of staff members who have obtained a basic educational qualification is quite low. Of the lecturers in the Faculty, only 24% have a formal University Teacher Qualification (Dutch: Basiskwalificatie Onderwijs, BKO). The committee advises staff members to obtain their BKO as soon as possible.

Study advisers support students to make well-considered choices within their individual programmes, and they track and stimulate study progress. The bachelor programme has three study advisers. Students meet with their study adviser several times a year. The committee highly appreciates the support and guidance the student advisers offer to their students. However, it also established that their workload is high. As their position is crucial, the committee advises reducing their workload.

Standard 3: Assessment and achieved learning outcomes

The most common forms of assessment are written examinations with open questions, assessments of individual papers, group papers or other submitted assignments, and assessments of performance during practical training. Most courses include more than one assessment to cover all learning outcomes.

The committee established that the exams were very objective assessments and at the appropriate level. They related well to the learning objectives of the courses they assessed.

The bachelor programme concludes with a bachelor thesis. To grade the theses, an assessment form accompanied by a rubric is used. The committee appreciates the assessment system. It studied the thesis assessment forms and concluded that the written evaluation provided on the assessment form was very brief. It recommends completing the forms in a uniform and thorough way.

The committee assessed ten theses. It agreed that the quality of the vast majority of the theses was adequate and acceptable. It came across theses that did not contain a clear research question or an inappropriate method description. It recommends solving this by assessing the research proposal as well.

The Board of Examiners consists of seven persons and covers five bachelor programmes and eleven master programmes. In the committee's view this workload is too high, due to the number of programmes and the number of electives in the programmes. It would prefer to reduce the number of programmes served by one Board of Examiners to maintain quality with an acceptable workload.

General conclusion

The committee concludes that the objectives and intended learning outcomes of the bachelor programme Environmental Sciences meet the standards required for an academic programme. It is of the opinion that the content and structure of the curriculum, the available staff, and the facilities constitute a coherent, attractive teaching-learning environment for the students. The programme has an adequate assessment system and demonstrates that the intended learning outcomes are achieved.

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

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: 7 October 2013



Prof. dr. W.A. Hafkamp



Dr. A. Venemans-Jellema

Summary judgement regarding the master programme Environmental Sciences

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

Standard 1: Intended learning outcomes

The domain of Environmental Sciences and initiatives towards establishing international benchmarks are described in the Dutch-Flemish referential framework for academic environmental education. The committee confirms that the framework is a solid basis for programmes in this discipline. It concluded that the learning outcomes of the framework were really well articulated. It recommends reformulating the learning outcomes of the programme to better match those of the referential framework.

The master programme in Environmental Sciences provides insight into the socio-economic causes, the characteristics and the impact of pollution and degradation of the natural environment. By taking an interdisciplinary approach, students learn to develop analytical tools and models, environmental technologies, socio-political arrangements, and economic instruments to control and prevent environmental problems.

The unique element of the programme is the combination of natural-science, social-science and technological-science aspects in one programme. The committee assessed whether students receive an interdisciplinary programme with sufficient depth, making them experts in a specific discipline. In its opinion, there is a good balance between depth and breadth in the programme.

Although graduates successfully enter careers in environmental consultancy, research, policy development, higher education and management, the committee finds that the programme is mostly research oriented. The future working ground of the student is internationally oriented. The committee finds that there is a good match between the diversity and international character of the students' future careers and the programme.

Standard 2: Teaching-learning environment

The curriculum consists of a two-year programme with four types of building blocks: regular courses, Academic Master Cluster, academic internship and thesis. Major thesis projects can be done at ten different Chair Groups. These same Chair Groups are responsible for the academic internships. The committee studied the content of the curriculum and concludes that it reflects the broad field of Environmental Sciences. It applauds the amount of free choice. However, the committee wonders if the large number of tracks should be retained. The committee suggests to compress the number of specialisations in case of small intake.

Wageningen University aims to offer programmes with an interdisciplinary approach. This was evident at the course level, but not at the programme level. The committee had difficulty identifying this educational philosophy as a specific didactical concept. It advises formulating an overarching didactical concept on the programme level.

The programme offers teaching methods that can be clustered into lectures, tutorials, practical training, group work, individual papers, and field trips. Group work plays an important role in the programme. The committee is impressed by the variety of teaching

methods. However, it warns about an excess of group work. Although it recognises the importance of group work, in its opinion this partly influences the depth of the courses.

All of the professors involved in the programmes (chair holders, personal, associate, assistant and special professors) have a PhD degree and are involved in the current research activities of the departments. In addition, designated researchers and lecturers are involved in the programmes. The committee recognises the staff's scientific quality, national and international academic reputation and teaching experience. However, it noted that the number of staff members who have obtained a basic educational qualification (BKO) is quite low (24%). The committee advises staff members to obtain their BKO as soon as possible.

According to the students, the study load is not that demanding. The committee suggests increasing the workload by deepening the courses.

Study advisers support students to make well-considered choices within their individual programmes, and they track and stimulate study progress. The master programme in Environmental Sciences has four study advisers. Students meet with their study adviser several times a year. The committee greatly appreciates the support and guidance the student advisers offer to its students. However, it established that their workload is high. As their position is crucial, the committee advises reducing their workload.

Standard 3: Assessment and achieved learning outcomes

The most common forms of assessment are written examinations with open questions, assessments of individual papers, group papers or other submitted assignments, and assessments of performance during practical training. Most courses include more than one assessment to cover all learning outcomes.

The committee established that the exams were very objective and traceable assessments and at the appropriate level. They related well to the learning objectives of the courses they assessed.

The thesis is considered to be the core element of the master programme. The committee assessed ten theses from the master programme in Environmental Sciences. On average, the theses were of good quality. According to the committee there was a large level of ambition expressed in the theses. However, it noted that a proper problem definition was missing in a significant number of the theses it studied. It believes that students need more instructions or guidance on this part of the research project.

The Board of Examiners consists of seven persons and covers five bachelor programmes and eleven master programmes. In the committee's view this workload is too high, due to the number of programmes and the number of electives in the programmes.

General conclusion

The committee concludes that the objectives and intended learning outcomes of the master programme in Environmental Sciences meet the standards required for an academic programme. It is of the opinion that the content and structure of the curriculum, the available staff, and the facilities constitute a coherent, attractive teaching-learning environment for the students. The programme has an adequate assessment system and demonstrates that the intended learning outcomes are achieved. The quality of the theses is good.

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

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: 7 October 2013



Prof. Dr. W.A. Hafkamp



Dr. A. Venemans-Jellema

Summary judgement regarding the master programme Urban Environmental Management

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

Standard 1: Intended learning outcomes

The domain of Environmental Sciences and initiatives towards establishing international benchmarks are described in the Dutch-Flemish referential framework for academic environmental education. The committee confirms that the framework is a solid basis for programmes in this discipline. It concluded that the learning outcomes of the framework were really well articulated. The learning outcomes of the programme could be formulated better.

The master programme in Urban Environmental Management aims at equipping its students with the outlook, concepts and tools to manage the urban environment. The programme unites four essential perspectives on the urban environment: environmental quality and health, environmental infrastructure and technology, spatial planning, and governance. In the committee's opinion, there is a good balance between depth and breadth in the programme. The committee is also pleased with the balance between natural and social sciences.

The programme intends to train students to become independent researchers on the one hand and to become proficient in urban environmental management or consultancy on the other. The committee appreciates this combination. It concluded that research and consultancy-oriented skills are well balanced in the programme.

Standard 2: Teaching-learning environment

The programme consists of a two-year programme with four types of building blocks: regular courses, Academic Master Cluster, academic internship and thesis. The four core perspectives of the programme are urban environmental quality and health, urban environmental technology, urban governance, and urban planning. Thesis research can be done at one of seven Chair Groups. Although all thesis tracks are considered to be relevant, the committee wonders if the large number of tracks should be retained.

In the academic years 2009/2010 and 2010/2011, radical changes were implemented in the curriculum. The committee appreciates the way the programme discussed its future and finds that the changes made have worked out very well.

Wageningen University aims to offer programmes with an interdisciplinary approach. This was evident at the course level, but not at the programme level. The committee had difficulty identifying this educational philosophy as a specific didactical concept. The committee advises formulating an overarching didactical concept on the programme level.

The programme offers teaching methods that can be clustered into lectures, tutorials, practical training, group work, individual papers, and field trips. Group work plays an important role in the programme. The committee is impressed by the variety of teaching methods. However, it warns about an excess of group work. Although it recognises the importance of group work, in its opinion this partly influences the depth of the courses.

Therefore, it recommends searching for a balance between group work and other teaching methods.

All of the professors involved in the programmes (chair holders, personal, associate, assistant and special professors) have a PhD degree and are involved in the current research activities of the departments. In addition, designated researchers and lecturers are involved in the programmes. The committee recognises the staff's scientific quality, national and international academic reputation and teaching experience. However, it noted that the number of staff members who have obtained a basic educational qualification (BKO) is quite low (24%). The committee advises staff members to obtain their BKO as soon as possible.

Study advisers support students to make well-considered choices within their individual programmes, and they track and stimulate study progress. The master programme in Urban Environmental Management has two study advisers. The committee greatly appreciates the support and guidance the student advisers offer to their students. However, it established that their workload is high. As their position is crucial, the committee advises reducing their workload.

Standard 3: Assessment and achieved learning outcomes

The most common forms of assessment are written examinations with open questions, assessments of individual papers, group papers or other submitted assignments, and assessments of performance during practical training. Most courses include more than one assessment to cover all learning outcomes.

The committee established that the exams were very objective and traceable assessments and at the appropriate level. They related well to the learning objectives of the courses they assessed.

The thesis is considered the core element of the master programme. The committee assessed ten theses from the master programme in Urban Environmental Management. On average, the theses were of good quality. According to the committee there was a large level of ambition expressed in them. However, it noted that a proper problem definition was missing in a significant number of the theses studied. It believes that students need more instructions or guidance in this part of the research project.

The Board of Examiners consists of seven persons and covers five bachelor programmes and eleven master programmes. In the committee's view, the workload of the Board of Examiners is too high, due to the number of programmes and the number of electives in the programmes.

General conclusion

The committee concludes that the objectives and intended learning outcomes of the master programme in Urban Environmental Management meet the standards required for an academic programme. It is of the opinion that the content and structure of the curriculum, the available staff, and the facilities constitute a coherent, attractive teaching-learning environment for the students. The programme has an adequate assessment system and demonstrates that the intended learning outcomes are achieved. The quality of the theses is good.

The committee assesses the standards from the Assessment framework for limited programme assessments in the following way:

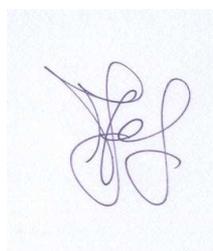
Standard 1: Intended learning outcomes	satisfactory
Standard 2: Teaching-learning environment	satisfactory
Standard 3: Assessment and achieved learning outcomes	satisfactory
General conclusion	satisfactory

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: 7 October 2013



Prof. Dr. W.A. Hafkamp



Dr. A. Venemans-Jellema

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's or master's; 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 integrate the myriad of perspectives within these disciplines into one complementary whole. 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 has 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 confirms that the framework is a solid basis for programmes in this discipline. The domain-specific framework also shows that the discipline is intrinsically international.

The Environmental Sciences programmes at Wageningen University unite natural-science, social-science and technological-science streams. The committee is in favour of this interdisciplinary approach.

1.2 Programme objectives and intended learning outcomes

Environmental sciences are applied in the detection and analysis of problems (including potential ones), as well as in the design, development and evaluation of solutions to these problems. The bachelor and master programmes teach students how to integrate knowledge and skills in dealing with complex environmental issues that are characterised by uncertainties, diverging social interests, and conflicting views on their nature and the best ways to solve them.

The critical reflections of all of the programmes compare their intended learning outcomes with the attainment levels defined in the Dutch-Flemish referential framework. The committee concluded that the learning outcomes of the framework were really well articulated. The learning outcomes of the programmes could be formulated better. The committee noted that the learning outcomes can be considered a historical remnant of the

former 'milieuhygiëne' programme, but it states that all three programmes require further updating.

The unique element of all three programmes is the combination of natural-science, social-science and technological-science streams. Therefore, the programmes use the expertise of the entire university. This could also lead to a possible friction between breadth and depth. The committee assessed whether students receive an interdisciplinary programme with sufficient depth, making them not only generalists, but also experts in a specific discipline. Students told the committee that they felt they have a broad knowledge of the field. In the committee's opinion, there is a good balance between depth and breadth of the programmes. It is also satisfied with the balance between natural and social sciences.

Wageningen University is very internationally oriented. It has already received the distinctive feature 'internationalisation' at the institutional level. It has a Strategic Plan, in which the internationalisation policy was made explicit. In this document the vision and verifiable objectives were described together with goals and activities. The goal of the master programmes in Environmental Sciences and in Urban Environmental Management is to bring together a student population with a large diversity: students from the Netherlands, from other member states of the European Union, and from developed and developing countries outside the European Union. Most courses in the common part of the programmes are explicitly designed to further cooperation between the students and the sharing of knowledge, experiences, and opinions among them.

Bachelor programme in Environmental Sciences

According to the critical reflection, the bachelor programme aims at developing an interdisciplinary attitude in its students that is conducive to an integrated approach to environmental and sustainability issues, i.e., problems caused by the interaction of human systems and Earth systems. The programme also aims at educating students who – proceeding from an interdisciplinary approach – are able to develop technology, socio-political arrangements or economic instruments to control or avoid environmental problems. The committee finds that there is a clear description of the objectives.

The intended learning outcomes are provided in Appendix 3. The committee observed that all Dublin descriptors are reflected in the intended learning outcomes. During the site visit, students stated that they could identify with these learning outcomes.

Master programme in Environmental Sciences

The master programme in Environmental Sciences provides insight into the socio-economic causes, the characteristics and the impact of pollution and degradation of the natural environment. By taking an interdisciplinary approach, students learn to develop analytical tools and models, environmental technologies, socio-political arrangements, and economic instruments to control and prevent environmental problems. The programme, which consists of ten specialisations, is thesis-oriented with an individual research project as its core. The committee agrees with this objective and profile. In its opinion they are quite broad, but that this seems to work very well in the Wageningen context, which is research-oriented.

The intended learning outcomes are included in Appendix 3. They define environmental sciences as an interdisciplinary field of research with environmental problem-solving and sustainable resource management as the main objects of study. In addition, they also refer to more general academic knowledge, skills and attitudes, including development of a critical

attitude and analytical and problem-solving skills. Except for their formulation, as mentioned above, the committee agrees with their content.

Master programme in Urban Environmental Management

The master programme in Urban Environmental Management aims at equipping its students with the outlook, concepts and tools to manage the urban environment. The programme unites four essential perspectives on the urban environment: environmental quality and health, environmental infrastructure and technology, spatial planning, and governance. During the site visit, the committee discussed in which way the term ‘urban’ was integrated in the programme. Lecturers explained that this is part of almost all courses, but that it is not possible to isolate it from the surroundings. The committee thinks the term ‘urban’ can be emphasised more explicitly in the objectives and learning outcomes.

The learning outcomes cover the entire programme, which consists of seven specialisations, and are therefore quite generic as they are valid for all specialisations. It is considered important to provide students with a strong foundation in the disciplines and skills that are essential to study urban environmental assessments and to prepare them for research in this field. The committee concludes that the intended learning outcomes of the programme are in line with the level and orientation of what can be expected of a master programme.

1.3 Requirements of the professional field and discipline

Bachelor programme

From the critical reflection and from the interviews, the committee concluded that currently, there are no employment opportunities for graduates of the bachelor programme within the domain. The programme therefore focuses on preparing students for an academic master programme. Graduates have unconditional access to five master programmes at Wageningen University: Aquaculture and Marine Resource Management, Climate Studies, Development and Rural Innovation, Environmental Sciences, and Urban Environmental Management. Students feel they are well educated to continue with a master programme.

Master programme in Environmental Sciences

The critical reflection states that most graduates enter careers in environmental consultancy, research and management, while others are involved in policy development and higher education. Although alumni with jobs in both consultancies and research were interviewed during the site visit, the committee finds that the programme seems to be more research-oriented. The future working domain of the student is internationally oriented. The committee finds that there is a good match between the diversity and international character of the students’ future careers and the programme.

Master of Urban Environmental Management

According to the critical reflection, the programme intends to combine academic education with preparation for professional practice. On the one hand, it trains students to become independent researchers, and on the other, it trains them to become proficient in urban environmental management or consultancy, activities that are not aiming at creating knowledge through academic research but rather at the application of research findings in professional practice. The committee appreciates this combination and thinks research- and consultancy-oriented skills are well balanced in the programme.

Considerations

The committee appreciates the Dutch-Flemish referential framework that forms a solid basis for the three programmes. Intended learning outcomes from this framework were really well articulated. The learning outcomes of the programmes could be formulated better.

The unique element of all three programmes is the combination of natural-science, social-science and technological-science streams in one programme. All programmes approach the field of environmental sciences from a very broad perspective, which is appreciated by the committee. Wageningen University has the knowledge and qualities to provide such broad programmes. In the committee's opinion, there is a good balance between depth and breadth of the programmes. It is also satisfied with the balance between natural and social sciences.

The relation with the professional field is good, especially for the master programmes. The committee understands that prospective employers are not (yet) looking for bachelor graduates. It concluded that both master programmes provide graduates with a solid foundation qualifying them for a career in academic research, consultancy or management.

Conclusion

Bachelor programme Environmental Sciences: the committee assesses Standard 1 as **satisfactory**.

Master programme in Environmental Sciences: the committee assesses Standard 1 as **satisfactory**.

Master programme in Urban Environmental Management: 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 academic year of Wageningen University consists of two semesters, each with three periods. In periods one, two and five (six weeks each) two courses are taught, one in the morning and one in the afternoon. Periods three and four are short periods with four weeks of teaching and only one course each. Period six lasts nine weeks. Each year students can take one exam and two resits for each course. Currently, this system is being reviewed, concerning the number of resits and the timing of the exams.

Bachelor programme

The curriculum of the bachelor programme is listed in Appendix 4. The three-year programme consists of general foundation courses, domain-related courses, integrating domain-related courses, an international study visit, major-specific courses, thesis and free choice. General foundation courses (33 EC) teach chemistry, physics, microbiology, biochemistry, ecology, mathematics, and statistics. These courses aim at expanding knowledge of these subjects to the level required for domain-related courses (53 EC). The domain-related courses address different approaches to environmental sciences. Halfway through the second year, students start taking courses (30 EC) to deepen their knowledge of one of three sub domains: Environmental Policy and Economics, Environmental Quality and Systems Analysis, or Environmental Technology. Depending on their major, students can schedule their free choice in either the first or the second semester of the third year. For the electives (30 EC) students have a choice between taking one of the approximately 60 minors offered by Wageningen University, studying at another Dutch university or studying at a university abroad.

At the end of the programme, students write a bachelor thesis. This thesis consists of two parts: the first part is a course of 3 EC that provides preparation with regard to the methodology and tools that the students need to carry out research or to make designs in their field of specialisation. Students need to pass this course before being allowed to continue with the second part of 9 EC that requires them to apply the tools and techniques previously gained by writing a summary paper on a chosen research topic or by designing a technological process. The course is completed when students present their paper to their peers, supervisor and examiners during the Bachelors' Conference that is organised twice a year.

The bachelor programme is considered well-structured, interdisciplinary and quite broad. The committee noted that a lot of courses are attended by students from different programmes, creating a setting that favours interdisciplinary education. However, it warns the programme not to lose its own identity.

The committee noted that there are few separate skill trainings in the curriculum. All learning skills are integrated in the domain-specific courses. It recommends teaching different skills more explicitly.

Although the programme has several courses that focus on the integration of different disciplines, the committee finds that the coherence between them could be improved. During the site visit the management stated that they are planning to strengthen the major-specific courses by providing more interactions among them. The committee applauds this idea.

Master programme Environmental Sciences

The curriculum consists of a two-year programme with four types of building blocks: regular courses (standard size 6 EC per course), Academic Master Cluster (12 EC), academic internship (24 EC) and thesis (36 EC). This curriculum is outlined in Appendix 4. The regular courses are divided in common courses, major-related courses and elective courses.

The programme contains 21 EC of regular courses. Two of them dealing with interdisciplinarity (together 9 EC) are compulsory, two others (12 EC) are semi-compulsory, i.e., the student has to take them unless their learning outcomes have already been covered by the student's preparatory training. For the other regular courses, students can develop an individual course list. The study adviser plays an important role in ensuring the coherence of this individual programme.

Although students can compose their own programme, they have to satisfy the requirements of the Chair Group offering the thesis. If the Chair Group has defined prerequisite knowledge (which is allowed up to a maximum of 12 EC), this is included in the course list. Usually, students must choose one or two courses (6-12 EC) from a list in order to comply with the recommendations of the Chair Group supervising the thesis work; they do so in consultation with the study adviser. A number of specialisations have an additional course that the student has to take if the study adviser deems it necessary, i.e., in case of serious doubt about whether the student is sufficiently prepared for the prescribed courses. In addition, there is room for electives. Students may use them to broaden their scope or to deepen their specialisation.

The compulsory Academic Master Cluster is scheduled in the second half of the first year. Students may choose between the field-specific European Workshop in Environmental Sciences and Management or the general Academic Consultancy Training in combination with Modular Skills Training (shared by many Wageningen master programmes). In the European Workshop in Environmental Quality and Management, students work together on an environmental problem commissioned by a client. During the site visit the committee attended a presentation regarding the European Workshop. It was really impressed by this course combining theory and skills in one workshop.

The thesis projects can be done at ten different Chair Groups, in alphabetical order:

- Air Quality and Atmospheric Chemistry
- Aquatic Ecology and Water Quality Management
- Environmental Economics and Natural Resources
- Environmental Policy
- Environmental Systems Analysis
- Environmental Technology
- Integrated Water Management
- Soil Biology and Biological Soil Quality
- Soil Chemistry and Chemical Soil Quality
- Toxicology

These same Chair Groups are responsible for the academic internships. The internship is done at external institutions on projects that are approved by the responsible Chair Group.

The committee studied the content of the curriculum and concludes that it reflects the broad field of Environmental Sciences. It applauds the amount of free choice. However, it noted that students are not always aware of the possibilities they have due to this large amount of choice. Most of the students the committee talked with during the site visit identified only three major programs: Environmental Technology, Environmental Systems Analysis and Environmental Policy. The committee suggests to compress the number of specialisations in case of small intake.

During the site visit the committee was able to look at course material, which confirmed that the quality of the courses is very good.

Master programme Urban Environmental Management

The programme consists of a two-year programme with four types of building blocks: regular courses (standard size 6 EC), Academic Master Cluster (12 EC), academic internship (24 EC) and thesis (36 EC). The four core perspectives of the programme are urban environmental quality and health, urban environmental technology, urban governance, and urban planning.

Besides a compulsory introductory course, the programme has four urban courses in the common part in which combinations of the four core perspectives with varying emphasis are treated at an advanced level. Each student has to select at least two of these courses.

The compulsory Academic Master Cluster is scheduled at the end of the first year. Students are advised to choose an urban topic of the field-specific European Workshop in Environmental Sciences and Management. Occasionally, when this would lead to delay, the general Academic Consultancy Training in combination with Modular Skills Training (shared by many master programmes) is available as an alternative.

Each major (specialisation) consists of a thesis, an internship and one or more prescribed courses. The courses in a major have to satisfy the requirements of the Chair Group offering the thesis. If the Chair Group has defined prerequisite knowledge, this is included in the course list. Some of the majors have an additional course that the student has to take if the study adviser deems it necessary, i.e., if she is in serious doubt whether the student is sufficiently prepared for the prescribed courses. In addition, there is room for one or two

electives. Students may use these to broaden their scope or deepen their specialisation. The thesis research can be done at seven Chair Groups, in alphabetical order:

- Environmental Economics and Natural Resources
- Environmental Policy
- Environmental Systems Analysis
- Environmental Technology
- Geo-information Science and Remote Sensing
- Land Use Planning
- Management Studies

The committee established that the curriculum of the master programme in Urban Environmental Management is designed and structured in a well-planned way. However, it suggests to better reflect the urban dimension of the programme in the courses. Even with the course Governance for Sustainable Cities, there is little on urban theory, addressing urban development, relations between cities, cities and hinterland or urban governance. The committee was enthusiastic about the perspective offered by the staff during the site visit. The staff talked about concepts such as urban metabolism and urban harvest as unifying concepts in the programme.

It recognises that the students may choose a great variety of specialisations and pursue a fairly individual study path due to the fact that a considerable part of the programme is devoted to the thesis.

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

In the academic years 2009/2010 and 2010/2011 radical changes were implemented in the curriculum. These changes were the result of the loss of two important senior members of the staff. The committee appreciates the way the programme discussed the future of the programme and finds that the changes made have worked out very well.

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 matrix included in the critical reflection, setting out the components of the programme linked to the intended learning outcomes, and the study material of the different courses. According to the students, the intended learning outcomes of courses are well explained and clear at the start of each course. The committee thinks that all three programmes are a good representation of the intended learning outcomes. It 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.

2.3 Didactic principle and teaching methods

Wageningen University aims to offer programmes with an interdisciplinary approach. This is meant to stimulate students to develop a broad view and a wide range of interests. Most of the courses are attended by students from different programmes, creating a setting that favours interdisciplinary education. Based on interviews with staff, students and management,

it was obvious that the interdisciplinary approach plays an important role in the programmes. However, the committee had difficulty identifying this educational philosophy as a specific didactical concept. The interdisciplinary approach was evident at the course level, but was not seen at the programme level despite a number of integrative courses. The committee advises formulating an overarching didactical concept on the programme level.

As students differ in their style of learning, the programmes expect that students' learning is stimulated by offering a variety of teaching and learning methods. The critical reflection states that both bachelor and master programmes offer teaching methods that can be clustered into lectures, tutorials, practical training, group work, individual papers, and field trips. Each individual course has a mix of teaching methods.

Different students, trained in different academic traditions, have different expectations. Some of them are not used to critical or independent thinking. This observation was confirmed in the interviews the committee conducted with students of both master programmes. Especially in the initial courses of both master programmes, there seems to be a gap between Dutch students and students from abroad. This difference is especially evident in group work.

Group work plays an important role in the bachelor and master programmes. According to the critical reflection, this method stimulates the students' intellectual skills as well as their communication skills. Students see the importance of group work. However, some students think there is an excess of group work. After discussing this topic in different sessions with students, it became clear that especially Dutch students from the master programme in Environmental Sciences are not satisfied with the large amount of group work. A lot of them graduated from the bachelor programme in Environmental Sciences and are already familiar with the concept of group work. In their opinion, there is a difference in experience with this method between Dutch students and students from abroad, which affects the depth of the courses.

Another friction is the possibility of free riding. Staff and lecturers of the master programmes have noticed the dissatisfaction of a group of students regarding group work, including the possibility of free riding. However, they state that group work is important in this field. In their opinion, free riding is reduced to a minimum by assessing individual performance.

The committee is impressed by the variety of teaching methods. Although it recognises the importance of group work, in its opinion, too many group work assignments partly influences the depth of the courses. Therefore, it recommends searching for a better balance between group work and other teaching methods.

2.4 Academic staff and student-teacher ratio

One of the appendices to the critical reflection contains a list of the academic staff members. All professors involved in the programmes (chair holders, personal, associate, assistant and special professors) have a PhD degree and are involved in current research activities of the departments. In addition, designated researchers and lecturers are involved in the programmes. The committee noted that in the three programmes there is only one female chair holder.

During the site visit the committee confirmed the extensive involvement and enthusiasm of the staff. It recognises the staff's scientific quality, national and international academic reputation and teaching experience. In addition, in the interviews with students, it did not receive any signals of inadequate teaching qualifications. It was impressed by the quantity and

quality of the research performed by the Chair Groups. It recommends that the staff develop a system to bring that active (well-funded) research more explicitly into the programmes. The committee noted that the number of staff members who have obtained a basic educational qualification is quite low. Of the lecturers in the Faculty, only 24% has a formal University Teacher Qualification (Dutch: Basiskwalificatie Onderwijs, BKO). According to the critical reflection, a BKO is required for new permanent staff and staff participating in a tenure track. For 2015, Wageningen University aims at 45% of the lecturers having a BKO, with another 30% following the BKO track. Lecturers told the committee during the site visit that they are encouraged by the management to qualify for the BKO.

The student-staff ratios of the three programmes are listed in Appendix 5. Wageningen University staff generally teaches in several programmes. As a consequence, student/staff ratios cannot be computed for a specific programme simply by counting staff and student numbers. Given the total number of students and an average of 45% of faculty time spent on education, the total personnel costs of the programmes can be converted into a value for the student-staff ratio. For the bachelor programme this calculation results in an effective value of 5.4, for the Environmental Sciences master of 7.2, and for the Urban Environmental Management master of 6.0. The university average is 6.8.

2.5 Student intake and study load

Students for the bachelor programme are admitted on the basis of their pre-university qualifications. The individual consideration of students who do not meet the standard requirements is centralised (Bachelor Admission Committee).

The basic rule of Wageningen University's admissions policy for master programmes is that students are only admitted if they can reasonably be expected to complete the programme in two years' time. To this end, general admission requirements are published on the internet, including detailed information on admission procedures. These requirements include a BSc degree (or equivalent) in a field of scientific relevance to the selected programme, a Grade Point Average (GPA) for this BSc of at least 70% of the maximum grade, fluency in English, both written and spoken, good skills in mathematics and/or statistics, and basic computer skills.

Bachelor programme

The programme admits students with a Dutch pre-university secondary education diploma (vwo) or equivalent. For enrolment, the vwo profile Nature & Technology is required. Applicants with the profile Nature & Health (as introduced in 2007) are admissible only if they included physics in their programme.

Student intake has increased from an average of 14 in the years 2002-2007 to 23 in the years 2008-2012. These numbers are similar to those of the other academic environmental bachelor programmes in the Netherlands, but low by comparison with most of the bachelor programmes offered by Wageningen University. According to the committee, the number of students could and should increase. Therefore, it appreciates the initiatives the programme took to encourage enrolment.

The total study load of the programme is 180 EC. The numbers of contact hours are 697, 670, and 580 for the first, second, and third year. The workload for students is fairly evenly distributed over the academic year. During the site visit, students estimated that the study load was demanding, but not too difficult. The committee finds the study load acceptable.

Master programme Environmental Sciences

The number of fully documented applications for admission to the programme was 477 in 2012/2013, of which 392 were admitted. The number of applications for the academic years 2010/11-2012/13 exceeds the number for the academic years 2005/06-2007/08 by over 60%. The committee wondered if a good admission procedure is possible with these large numbers of applications. According to the management, there is room for improvement at this point. Currently, there is not enough time for an extensive selection process.

The number of students who enrolled over the past ten years varies between 50 and 113 students. Currently, 70% of the students originate from abroad. Enrolment partly depends on the availability of scholarships.

The study load of the programme is 120 EC. The number of contact hours in the first year is 616 hours and in the second year, 38 hours. The programme stated that the small number of contact hours in the second year is due to the fact that the thesis and internship only have a limited number of face-to-face contact hours.

According to the students, the study load is not that demanding. This largely depends on the students' background and the effort they want to put into it. The committee also noted that alumni and students confirm that it is feasible to finish the thesis within the set time. It recommends increasing the workload by deepening the courses.

Master programme Urban Environmental Management

Interest in the Urban Environmental Management programme is more or less stable with an annual number of assessed applications of about 135, 25% of which is rejected. The number of students who enrolled over the past ten years varied between 10 and 32 students, with a mean of 27 students. The committee assessed the number of enrolling students is low. This causes an imbalance between the number of enrolling students and the number of specialisations offered, as discussed in section 2.1.

According to the critical reflection, the composition of the student body has changed rapidly as a result of a strong increase in the intake of Dutch students in recent years. Within six years, a programme with hardly any Dutch students transformed into a programme with 40% Dutch students. This may affect the cooperation between students; lecturers may have to adjust their courses and themselves to a new environment.

The study load of the programme is 120 EC. The number of contact hours in the first year is 655 hours and in the second year, 38 hours. Like the master programme of Environmental Sciences, the committee assesses this number of contact hours in the second year as too low.

According to the critical reflection, systematic evaluations show that the programme is neither too heavy nor too light. This was confirmed during the interviews with students and alumni. Students mentioned that foreign students in particular have difficulties in the beginning, because of the differences in the educational system and lots of new information. The committee finds the study load acceptable.

2.6 Tutoring system, quality management and programme-specific facilities

Tutoring system

The study advisers focus on coaching the students and stimulating study success. They support students to make well-considered choices within their individual programmes, and

they track and stimulate study progress. Students meet with their study adviser several times a year, starting from the annual introduction day, or even before then for international students coming to Wageningen. Contact moments are arranged at the request of students and by the study advisers, e.g. to discuss choices in the study programme. The study advisers also invite students for a talk if they notice a study delay.

Although differences exist between programmes, all Wageningen programmes provide a lot of freedom to the individual student, making the programmes student-centred. The Chair Groups and their research strongly influence the courses offered, making the programmes also course-oriented. This makes the position of the study advisers crucial. They play a major role in assuring quality and coherency in the individual curriculum of each student and have to make sure that students select courses that meet the university's requirements as well.

The bachelor programme has three study advisers, the Environmental Sciences programme has four study advisers, and the Urban Environmental Management programme two. They are also partly members of the academic staff. The study advisers are very capable of advising students in their choice of courses in the opinion of the committee. It highly appreciates the support and guidance the student advisers offer to their students. However, it established that the workload of the study advisers is high. As their position is crucial, it advises reducing their workload.

Quality management

Safeguarding the coherence of the programme and improving the curriculum are the prime responsibilities of the Programme Committee, although its proposals have to remain within the budget allocated by the Board of the Education Institute and are subject to the Board's approval. The annual 'Education Modification Cycle' offers the opportunity of updating and changing the curriculum every year, thus enabling the Programme Committee to respond quickly to external demands passed on by the External Advisory Committee, as well as to developments within the university. The university is responsible for the course and programme evaluations. The results are reported to the lecturers and the programme management. The management discusses the results with the Programme Committee that advises on actions to be taken. The Programme Committee meets every eight weeks. The main topics of the last meetings were the depth of the courses and the presence of skills in courses.

Programme-specific facilities

Wageningen University has chosen to centralise all teaching facilities like lecture rooms, labs, rooms for group work, and the university library on its Campus. The committee learned during the site visit that students are generally satisfied with the Campus. However, they complained about the lack of room for group work. This is expected to improve when the new Orion education building, now under construction, adds to the existing facilities in 2013.

Considerations

The bachelor programme is considered well-structured, interdisciplinary and quite broad. The committee recommends adding skill trainings to the curriculum and improving the coherence between courses.

In the committee's opinion, the master programme in Environmental Sciences reflects the broad field of the discipline. The committee applauds the amount of free choice. However, it noted that students are not always aware of the possibilities they have due to this large quantity. It was impressed by the European Workshop.

The committee established that the curriculum of the master programme in Urban Environmental Management is designed and structured in a well-planned way. It recognises that the students may choose a great variety of specialisations. Although all specialisations are considered to be relevant, it wonders if the large number of tracks should be retained.

The committee recognises the interdisciplinary approach in all three programmes. However, although this was clearly evident at the course level, it was less visible at the programme level despite integrative courses. For that reason, the committee had difficulty identifying this educational philosophy as a specific didactical concept.

The committee appreciates the wide variety of teaching methods used. It agrees with the programme that group work is an important teaching method in this field. However, it recommends searching for a balance between group work and other teaching methods in order to keep the students motivated.

The committee was impressed by the staff; their quantity and research quality are good. It advises staff members to obtain their basis educational qualification as soon as possible.

Study advisers play a major role in assuring quality and coherency in the individual curriculum of each student and have to make sure that students select courses that meet the university's requirements as well. The study advisers are very capable of advising students in their choice of courses in the opinion of the committee. However, it established that the workload of the study advisers is high. As their position is crucial, it advises reducing their workload.

Conclusion

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

Master programme Environmental Sciences: the committee assesses Standard 2 as **satisfactory**.

Master programme Urban Environmental Management: 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

A standard requirement for all Wageningen University courses is that lecturers formulate intended learning outcomes, which are published in the Study Handbook and also in the course guides. These course guides explain what a course is about, how it is organised, and how students are expected to participate. Also part of the course guide is the assessment strategy (Dutch: *toetsplan*). The newly introduced requirements for assessment strategies make clear how and when a learning outcome of a course is assessed, who is involved in assessing students, and how the final mark will be determined. The assessment strategy also serves to show the transparency and validity of the assessment.

The ‘fixed’ rules of any programme are defined in the Education and Examination Regulations for Bachelor’s Study Programmes at Wageningen University (EER BSc) and Education and Examination Regulations for Master’s Study Programmes at Wageningen University (EER MSc). During the site visit, the committee established that students have no complaints concerning the examination procedures. They consider the procedures to be transparent.

The courses’ learning outcomes determine the form of assessment. Most courses include more than one assessment to cover all learning outcomes. The most common forms of assessment are written examinations with open questions, assessments of individual papers, group papers or other submitted assignments (and combinations of them), and assessments of performance during practical training.

To enhance the reliability of assessment (reproducibility of marking), examiners need to explain which elements in the answers of students lead to a certain mark. This is shown by model answers, assessment criteria or rubrics. Sometimes a second assessor is required to enhance reliability. Students have the right and the opportunity to inspect their exam papers to see where they went wrong, and to learn from their mistakes.

During the site visit, the members of the committee studied written exams and assignments. They established that the exams were very objective, traceable assessments and at the appropriate level. They related well to the learning objectives of the courses they assessed. The committee appreciates the programmes’ awareness of the importance of different kinds of assessments and testing in relation to individual and group work.

Group assessments may lead to free riding. According to the students, free riding occurs. Lecturers convinced the committee that they are aware of this problem. They are working on tools to reduce this phenomenon. In addition, they stated that for each course there is always an individual assessment also. The committee appreciates the steps the programme took to reduce free riding.

3.2 Theses

Bachelor programme

The bachelor programme concludes with a bachelor thesis. To grade the theses, an assessment form accompanied by a rubric is used. The main categories (research, written report, presentation, and final discussion) should all have an assessment of 'sufficient' (≥ 5.5) before the total thesis work can be considered adequate; no compensation between main categories is possible. In addition, similar weighting factors are used for the categories. The committee appreciates the assessment system.

Prior to the site visit, the committee members had received ten recent bachelor theses, selected from a list in the critical reflection. One thesis was rated unsatisfactory by one committee member, but not by the second committee member. The thesis was subsequently discussed in the committee. It concluded that probably the supervision was less than adequate in this case. It did not notice this aspect with other theses. The committee agreed that the quality of the vast majority of the theses was adequate and acceptable, but it concluded that they were not of an exceptionally high level. One recurring issue was that the committee came across theses that did not contain a clear research question or an appropriate method description. It recommends resolving this by assessing the research proposal.

The committee studied the assessment forms and concluded that the written evaluation provided on the assessment form was very brief. Staff members stated during the site visit that information regarding the grade and feedback on the positive and negative aspects of each thesis is being provided orally to the students. The committee appreciates that oral feedback is given, but recommends also completing the forms in a uniform and complete way.

Master programmes Environmental Sciences and Urban Environmental Management

The thesis is considered the core element of the master programmes. In their thesis students have to demonstrate that they are able to design, plan, and execute research in the field of environmental sciences or urban environmental management in accordance with academic standards. The thesis covers the entire process of proposal writing, development of theoretical framework and hypothesis, methodological design, data acquisition and analysis, discussion of results and drawing sound conclusions. The thesis project is finalised by a written report, a presentation ('*colloquium*'), and a final discussion between student, supervisor(s) and examiner.

Chair Groups use the assessment form designed for Wageningen University as a whole to evaluate the thesis. This form assesses general research competences (30-60%), the quality of the thesis report (30-60%), the colloquium (5%) and the final oral examination (5%). The variation in weights of the different criteria reflects the differences in nature of thesis research with the different Chair Groups involved in the programmes. An MSc Thesis contract between supervisor and student should specify the weighting factors that will be used in the assessment. This contract has to be drawn up before the student starts working on the thesis. The study adviser has to sign the contract to confirm that the student has made sufficient progress.

A rubric has been developed for each component of the assessment form, describing the relation between level of performance and the grades. The thesis work is always assessed by at least two assessors, one of them not personally involved in the supervision.

The committee assessed ten theses from the master programme of Environmental Sciences and ten theses from the master programme of Urban Environmental Management. In general, the theses were of good quality. According to the committee, there was a large level of ambition in the theses. The theses also illustrate that the students have achieved the intended learning outcomes as formulated by the programmes. During the site visit students and alumni mentioned that they were really satisfied with the guidance during their research project.

However, the committee noted that a proper problem definition was missing in a significant number of the theses it studied. It states that the problem definition is an important part of the research and should be graded separately. It thinks that students could use more instructions or guidance in this part of the research project. The Programme Committee has discussed with the Examining Board the necessity of including the development and quality of the thesis proposal in the assessment form, until now with no avail. The committee applauds this idea and stimulates the Examining Board to look into this issue.

3.3 Board of Examiners

The Board of Examiners is responsible for maintaining the high quality of the programmes. It safeguards the criteria for the assessment of examinations and checks on a regular basis whether the examinations comply with the set rules. As there is a lot of free choice in the programmes (especially in the master programmes), the Board of Examiners also spends a lot of time judging the quality of each individual programme.

The Board of Examiners is aware of the recent changes to the Higher Education and Research Act introduced in September 2010 and its responsibility for the quality of assessment procedures and of the theses. It has prepared documents to help examiners produce valid, reliable and transparent assessments. It also visits Chair Groups on a regular basis to verify the quality of assessments. Besides information from Chair Groups about the quality of assessments, the courses are also evaluated. However, the quality of these evaluations is minimal due to a low response by students.

The Board of Examiners consists of seven persons. Most members are researchers or lecturers. It covers five bachelor programmes and eleven master programmes. In the committee's view, the workload of the Board of Examiners is too high, due to the number of programmes and the amount of free choice. It would prefer to see the number of programmes covered by one Board of Examiners reduced to ensure the quality with an acceptable workload.

3.4 Professional activities after graduation

Bachelor programme

The average success rate after four years (66% for the 2004-2007 cohorts) compares favourably with the university average of 54% over the same period, but still falls short of the target of 70% to be attained by 2014, as agreed by the Ministry of Education and the collective Dutch research universities. Wageningen University recently raised the target to 75% by 2015. The main risk factor identified is a low average mark for the subjects taken during prior vwo education. A promising result is that students who combine the new vwo profiles Nature & Technology and Nature & Health (the majority of the intake since 2010) do better than students with a single profile or the combination of the old profiles. The target of 75% finishing after four years seems out of reach for the 2009 cohort (though 70% seems possible), but the 2010 and 2011 cohorts are still on schedule.

The critical reflection states that the bachelor programme equips students to participate successfully in postgraduate training programmes, since the job market is not interested in academic bachelor graduates. Graduates have unconditional access to five master programmes at Wageningen University: Aquaculture and Marine Resource Management, Climate Studies, Development and Rural Innovation, Environmental Sciences, and Urban Environmental Management. Of all graduates, 85% enrolled in a Wageningen master programme, most of them in Environmental Sciences. Nine graduates (7%) continued their studies at another university in the Netherlands or elsewhere in Europe. Nine students did not enrol in a master programme.

Master programme Environmental Sciences

The success rates after two and three years amounted to 67% (2004-2010 cohorts) and 86% (2004-2009 cohorts), respectively, similar to the average values of 65% and 86% for Wageningen University. The drop-out rate for the 2004-2010 cohorts averages 7%, which is equal to the university average over the same period. Part of the drop-out is caused by students who switch to another master programme, a phenomenon that is more frequent in this programme than in most other master programmes of Wageningen University. Half of the drop-outs of the 2004-2010 cohorts, 17 students, graduated in another programme, 12 of them in the related Urban Environmental Management MSc programme. The other half of the drop-outs left the university without an MSc degree, because of insufficient performance, but also for reasons that were not related to the programme (e.g., health or family affairs back home).

Information about graduates' entry into the labour market is provided by the Scientific Education Monitor (Dutch: WO-monitor) that is published every other year. This survey is held among recent graduates of all Dutch research universities. The Scientific Education Monitors 2009 and 2011 show that 85% were in a paid job of at least 12 hours per week. Of the graduates 24% had started a PhD study. Of the respondents from the 2011 edition, 76% indicate that environmental sciences or a closely related field of study was required for their current position; 19% held a position that did not require a specific field of study.

Master programme Urban Environmental Management

The success rates after two and three years amounted to 69% (2004-2010 cohorts) and 83% (2004-2009 cohorts), respectively, similar to the average values of 65% and 86% for Wageningen University. The drop-out rate for the 2004-2010 cohorts averages 14%, which is double the university average over the same period. Eight out of the fifteen drop-outs from the 2004-2008 cohorts graduated in the related Environmental Sciences master programme. One alumnus mentioned during the site visit that he switched from Urban Environmental Management to Environmental Sciences because he missed the scientific component.

Based on the latest Career Monitor that included 28 respondents (response rate 21%) from the programme who had graduated between February 2004 and October 2009, six respondents have earned a PhD or are working on it at universities in the Netherlands. Another eleven respondents intend to start with a PhD within a few years. Nineteen respondents have a paid job (\geq twelve hours a week) or combine a paid job with freelance work, two are studying, and five characterise their current situation as involuntarily unemployed. Of the graduates in a job, 77% indicate that urban environmental management or a closely related field of study was required for their current position.

During the site visit, alumni of both master programmes stated that doing an internship was very helpful in finding a job. However, there was hardly any help from the programme in

finding an internship. Alumni would appreciate more guidance during this process. The committee agreed with them.

Regarding the professional activities after graduation, the committee did not find any major issues worth commenting on. It finds the success rates satisfactory. For both master programmes, it appreciates that most graduates find a job.

Considerations

The committee was impressed with the mixture of assessment methods in all programmes. It is clear that the assessments are carefully designed to evaluate specific types of intended learning outcomes.

Prior to the site visit, the committee members had received ten recent bachelor theses. The committee agreed that the quality of the vast majority of the theses was adequate and acceptable, but they concluded that they were not of a high level. The committee came across theses that did not contain a clear research question or an appropriate method description.

The committee assessed ten theses from the master programme of Environmental Sciences and ten theses from the master programme of Urban Environmental Management. In general, the theses were of good quality.

For both the bachelor theses and the master theses, the committee recommends including the development and quality of the thesis proposal in the assessment form.

The Board of Examiners performs its legal tasks. In the committee's view, the workload of the Board of Examiners is too high. It would prefer to reduce the number of programmes covered by one Board of Examiners to ensure the quality.

The success rates are satisfactory; for all programmes they belong to the average of Wageningen University. Job opportunities for bachelor graduates are limited. Master graduates are finding it difficult to obtain good positions due to the economic situation in the Netherlands. Nevertheless, most graduates are able to find jobs in their discipline, which is impressive.

Conclusion

Bachelor programme Environmental Sciences: the committee assesses Standard 3 as **satisfactory**.

Master programme Environmental Sciences: the committee assesses Standard 3 as **satisfactory**.

Master programme Urban Environmental Management: the committee assesses Standard 3 as **satisfactory**.

General conclusion

The committee concludes that the objectives and intended learning outcomes of the bachelor programme in Environmental Sciences and master programmes in Environmental Sciences and in Urban Environmental Management meet the standards required for an academic bachelor or master programme.

The committee is of the opinion that the content and structure of the curricula, the available staff, and the facilities constitute a coherent, attractive teaching-learning environment for the students.

According to the committee, the programmes have an adequate assessment system and demonstrate that the intended learning outcomes are achieved.

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 and the master programme in Environmental Sciences and the master programme in Urban Environmental Management can be qualified as 'satisfactory'.

Conclusion

The committee assesses the *bachelor programme Environmental Sciences* as **satisfactory**.

The committee assesses the *master programme Environmental Sciences* as **satisfactory**.

The committee assesses the *master programme Urban Environmental Management* as **satisfactory**.

Appendices

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

Prof. W. Hafkamp (chair of the committee) is Professor in Environmental Economics, Erasmus University, Rotterdam (1994-present). He graduated in Econometrics at the Tilburg University in 1977 and got his PhD in economics at the Free University, Amsterdam (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). He 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 Professor he is a Policy Advisor for the industry. 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 the environment, urban development and spatial policy, environmental management in industry, waste management and safety to sustainable development.

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, he 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 specialise in the eddy covariance technique to study ecosystem-atmosphere interactions, and in ecosystem manipulation methodologies). His 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. He was a member of the review committee on Climate Studies at Wageningen University (2012).

Prof. A. Jamison is Professor in Technology, Environment and Society, Aalborg University, Denmark. In 1970 he obtained his BA 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 has organised and taught courses on the theory and methods of environmental science and social movements and politics at Malmö University College. He also organised and taught a course on the 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 is the coordinator of a research program in Denmark on engineering education with a particular focus on sustainability issues (PROCEED). He served as a consultant for the ESSENCE network that was funded by the EU to investigate higher education in the environmental field. He has also been a coordinator and co-founder of a master's degree program in environmental

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

Prof. J. Monstadt is full Professor and Head of the Working Group for Spatial and Infrastructure Planning, Department for Civil Engineering and Department for Architecture, Darmstadt University of Technology, Darmstadt, Germany (since 2009). He graduated in Environmental Planning at the Faculty of Environment and Society, Berlin University of Technology and got his PhD in Environmental planning in 2003, also at the Berlin University of Technology (thesis: ‘The Modernization of Electricity Systems. Regional Energy and Climate Policy in the Process of Liberalization and Privatization’). He was a Postdoctoral Research Fellow at Eawag – the Water Research Institute of the Swiss Federal Institute of Technology (ETH), Centre for Innovation Research in the Utility Sectors, Lucerne/Zürich (2004-2006). During 2007-2009 he was a Senior Research Fellow at the City Institute at York University, Toronto, Canada, and at the Keston Institute for Infrastructure and Public Finance, School of Policy, Planning, and Development, University of Southern California, Los Angeles, USA.

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 studied abroad at Aalborg Universiteit, joining the Environmental Management & Sustainability Science. 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 borne. 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's and master's 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 organisations 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:). This report largely focuses on the substantive benchmark for bachelor’s 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 professionalisation 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 the 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-ema.org).
- Planet Europe is a Joint Master's 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 interdisciplinary 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 specialisations 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 specialisations (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 interdisciplinary categorisation and specialisation 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's and eight master's 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's 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's programme with a more specific master's programme, but has also led to a wider range of more specialised master's 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's 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 specialisations 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's programmes were required to have at least one related bachelor's programme, the advanced study programmes were becoming financially unfeasible. As a result, many of the advanced master's programmes were demoted to the status of regular master's to ensure better alignment with multiple non-environmental bachelor's programmes.

While Flanders currently has two specialised environmental science bachelor's 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's 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's 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 interdisciplinary nature of the environmental science programmes within the natural or social science disciplines. Combined with the first axis, this differentiates the broad, interdisciplinary (environmental science) bachelor's programmes in the Netherlands from the more disciplinary ones. Both types can be followed with an interdisciplinary but thematically strong master's programme (Environment and Resource Management, VU; Energy and Environmental Sciences, RUG; and others) or a more general master's programme (Environmental Sciences, OU, UA, UU, WUR).

According to the CROHO format, the Dutch master's programmes are considered interdisciplinary 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's graduates, albeit often with the requirement of a pre-master's programme. In Flanders, the seven visited master's programmes (VUB, UG and UA) were all interdisciplinary yet all very different. Although sometimes accessible to a wider range of bachelor's 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's 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's programmes in both Flanders and the Netherlands are not truly interdisciplinary. In this context, the term 'environmental programme' refers to an environmental specialisation 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's 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 internationalisation: 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 internationalisation 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’s programmes in international partnerships (see above). Other programmes work with foreign guest lecturers, short study trips to supplement courses or the master’s 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’s 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’s, 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 organisations. 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's 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 organisations 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’s 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 synchronisation 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’s 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’s is the main goal’. Therefore, also in Flanders environmental professionals who only hold an academic bachelor’s 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 organisations. 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's 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's 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 internationalisation, both with regard to inflow and outflow.

Bachelor's in Environmental Sciences

Students who have completed an environment-specific bachelor's 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 interdisciplinary 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's and the master's programmes, it is also important for academic environmental bachelor's 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's programmes if desired.

Master's programmes in Environmental Sciences

As indicated above, mobility of students between bachelor's and master's programmes is on the rise. As a result, environmental programmes are increasingly faced with an inflow of students to the master's programme, without having followed a 'logical' preliminary bachelor's. 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's 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) organisations.

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’s 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 Environmental Sciences

After successful completion of this programme graduates are expected to be able to:

1. define Earth systems and the physical, chemical and biological processes that are involved in environmental pollution and degradation;
2. apply systems analysis methods and tools to analyse and understand human interactions with the environment;
3. show how natural physical, chemical and biological processes can be utilised to mitigate or eliminate the effects of human activities on the environment;
4. explain the sociological, administrative, legal and economic aspects of the interactions between people and their physical environment;
5. position the environmental sciences in relation to other fields of science, and justify the reasons for their existence;
6. characterise the fields of activity of professional environmental scientists;
7. approach environmental and sustainability issues in an interdisciplinary way and deal with complexity and changes over scales of time and space;
8. analyse environmental and sustainability issues under supervision by defining a research problem, planning research, searching and reviewing relevant scientific literature, collecting, processing and interpreting data, and putting the results in a wider context;
9. communicate their findings in a clear and concise manner, both in writing and orally, to a scientific audience;
10. develop arguments from various points of view, including philosophical and ethical perspectives, take and defend a position, and show readiness to shift ground if necessary;
11. translate scientific knowledge into policy or technological recommendations with a view to solving environmental and sustainability issues;
12. function effectively in interdisciplinary teams dealing with research, policy development or management of environmental issues even in a tight time frame and an international setting;
13. Reflect upon personal competence and design and plan their own learning path.

A. After successful completion of this programme graduates of the **major environmental policy and economics** are also expected to be able to:

14. analyse and evaluate policy developments (including economic, social and legal aspects) regarding environmental and sustainability issues;
15. summarise academic literature and formulate theoretically informed opinions on latest policy developments;
16. Integrate knowledge and analysis in a document that presents optional policy approaches in a clear and concise manner.

B. After successful completion of this programme graduates of the **major environmental quality and systems analysis** are also expected to be able to:

14. systematically assess environmental and sustainability issues and summarise academic literature on these issues;
15. integrate the information gained in a document presenting causes and effects of environmental and sustainability issues;

16. Identify and evaluate optional responses in a clear and concise manner.

C. After successful completion of this programme graduates of the **major environmental technology** are also expected to be able to:

14. evaluate the usefulness of academic findings from basic scientific fields - like microbiology, chemistry and physics - for technology development;
15. design technological solutions for environmental and sustainability issues;
16. Test these solutions to technological, economic, and social preconditions.

After successful completion of this programme graduates are expected to be able to:

1. draw up an integrated analysis of perceived or potential environmental and sustainability issues, based on insight in the environmental causality chain, linking driving forces in society, pressure on the environment, changes in environmental quality, effects on nature and public health, and social response;
2. take multiple perspectives and pursue interdisciplinary approaches to environmental problem solving and sustainable resource management;
3. interact with stakeholders of different cultural backgrounds or nationalities and with specialists from other disciplines so as to arrive at a common identification, analysis, and solution strategy of the issues involved;
4. define the scientific issues ensuing from an integrated analysis, taking account of relevant spatial scales (from local to global) and adopting a long-term perspective;
5. independently design and execute environmental research in accordance with academic standards, thus contributing to the development of the body of knowledge in the field, or to the development of creative and innovative solutions to environmental and sustainability issues;
6. design strategies to deal with environmental and sustainability issues in the practice of policy development and management;
7. act as a consultant, advising (non-)governmental organisations and commercial corporations on how best to improve current and future activities with regard to the environment;
8. clearly present, both orally and in writing, research proposals and results, as well as plans for measures and interventions, taking into account the nature of the target group;
9. formulate and manage projects in the fields of research, consultancy or management;
10. support working parties and committees, negotiate, and act as a mediator, effectively and appropriately dealing with cultural diversity;
11. reflect on the ethical aspects of their research and plans for measures and interventions;
12. Design and plan their own learning processes by virtue of continuous reflection on personal knowledge, skills, attitudes and performance.

After successful completion of this programme graduates are expected to be able to:

1. demonstrate thorough knowledge and understanding of the urban environment and its infrastructure; the economic, social and political factors involved; the possibilities and limitations of technological means to curb emissions and limit resource depletion; relevant management and quality assurance systems;
2. apply theoretical and methodological concepts in urban environment assessments so as to identify environmental issues at various scales of time and space;
3. independently formulate and execute urban environment research in accordance with academic standards, thus contributing to the development of the body of knowledge in the field, or to the development of creative and innovative solutions to urban environmental issues;
4. develop realistic environmental goals for governmental organisations and commercial corporations and establish strategies to introduce changes to existing systems, which take into account environmental factors as well as financial, social and political factors;
5. design strategies to include environmental aspects in, and develop indicators of environmental performance and benchmarking for urban management systems;
6. act as a consultant, advising governmental organisations and commercial corporations on how best to improve current and future activities with regard to the environment;
7. engage different stakeholders and communicate with specialists from other disciplines;
8. demonstrate cross-disciplinary views on urban environment issues, taking into account various stakeholders and interests;
9. clearly present, both orally and in writing, research proposals and results, as well as plans for measures and interventions, taking into account the nature of the target group;
10. support working parties and committees, negotiate, and act as a mediator, effectively and appropriately dealing with cultural diversity;
11. reflect on the ethical aspects of their research and plans for measures and interventions;
12. Design and plan their own learning processes by virtue of continuous reflection on personal knowledge, skills, attitudes and performance.

Appendix 4: Overview of the curriculum

Bachelor Environmental Sciences

Course code	Course name	Credit points	CS/RO	Year	Period
<i>Common part</i>					
PCC-12303	General Chemistry 1	3.00	CS	B1	1AF
YEI-10306	Introduction Environmental Sciences	6.00	CS	B1	1MO
SGL-10806	Soil and Water I	6.00	CS	B1	2AF
BIP-10306	Introductory Physics	6.00	CS	B1	2MO
MAT-14903	Mathematics 2	3.00	CS	B1	3AF
PCC-12403	General Chemistry 2	3.00	CS	B1	3MO
MAT-15403	Statistics 2	3.00	CS	B1	4AF
ENP-10806	Environmental Policy Instruments	6.00	CS	B1	4MO+5MO
MIB-10306	Microbiology & Biochemistry	6.00	CS	B1	5AF
MAT-15003	Mathematics 3	3.00	CS	B1	5MO
NCP-10503	Ecology I	3.00	CS	B1	6MO
ESA-10309	Environmental Sciences and Society	9.00	CS	B1	6WD
ETE-10806	Introduction Environmental Technology	6.00	CS	B2	1AF
MAQ-11306	Air Quality	6.00		B2	1MO
ESA-20506	Introduction to Environmental Systems Analysis	6.00	CS	B2	2AF
ENP-23806	Sustainability Transitions: Concepts, Issues and Indicators	6.00	CS	B2	2MO
AEW-21306	Soil and Water II	6.00	CS	B2	4WD
ETE-20310	Environmental Project Studies	10.00	CS	B2	5MO+6MO
ENP-24305	Social Scientific Analysis of Environmental Issues	5.00	CS	B2	6AF
ESA-22303	International Study Visits Environmental Sciences	3.00	CS	B2	6WD
MAT-14803	Mathematics 1	3.00	RO1*	B1	1AF
MAT-15303	Statistics 1	3.00	RO2*	B1	1AF

<i>Major Environmental Policy and Economics (A)</i>					
LAW-22306	Sustainable Development Law	6.00	CS	B2	3WD
ENR-21306	Environmental Economics for Environmental Sciences	6.00	CS	B2	5AF
GEO-20406	Human Geography: Theory and Practice	6.00	CS	B3	1AF
ENP-20806	Environmental Management and Industry	6.00	CS	B3	1MO
COM-20806	Environmental Communication and Innovation	6.00	CS	B3	2AF
ENP-81603	BSc Thesis Environmental Policy and Economics Part 1	3.00	CS	B3	2MO
ENP-81609	BSc Thesis Environmental Policy and Economics Part 2	9.00	CS	B3	2MO+3WD

<i>Major Environmental Quality and Systems Analysis (B)</i>					
GRS-10306	Introduction Geo-information Science	6.00	CS	B2	3WD
SOQ-21306	Soil Pollution and Soil Protection	6.00	CS	B2	5AF
AEW-31306	Water Quality	6.00	CS	B3	4WD
NCP-21803	Ecology of Communities, Ecosystems and Landscapes: Theory	3.00	CS	B3	5AF
ESA-81303	BSc Thesis Environmental Quality and Systems Analysis Part 1	3.00	CS	B3	5AF
TOX-30806	Environmental Toxicology	6.00	CS	B3	5MO
NCP-22303	Ecology of Communities, Ecosystems and Landscapes: Field Excursions	3.00	CS	B3	6WD
ESA-81309	BSc Thesis Environmental Quality and Systems Analysis Part 2	9.00	CS	B3	6WD

<i>Major Environmental Technology (C)</i>					
ORC-13303	Environmental Organic Chemistry	3.00	CS	B2	3AF
ORC-12803	Bio-organic Chemistry I	3.00	CS	B2	3MO
BRD-22803	Physical Transport Phenomena	3.00	CS	B2	5AF
ETE-23803	Environmental Process Engineering	3.00	CS	B2	5AF
MAT-23306	Multivariate Mathematics Applied	6.00	CS	B3	1AF
ETE-21306	Water Treatment	6.00	CS	B3	1MO
ETE-24304	Soil and Groundwater Remediation	4.00	CS	B3	2MO
PCC-21802	Introductory Thermodynamics	2.00	CS	B3	2MO
ETE-80903	BSc Thesis Environmental Technology Part 1: Design Tools	3.00	CS	B3	2AF
ETE-80909	BSc Thesis Environmental Technology Part 2	9.00	CS	B3	2AF+3WD

Master Environmental Sciences

Course code	Course name	Credit points	CS/RO	Year	Period
<i>Common part</i>					
ENP-35806	Environmental Quality and Governance	6.00	CS	M1	2AF, 5AF
ESA-32303	Seminar Interdisciplinarity in Scientific Research and Education	3.00	CS	M1/2	2AF, 5AF
ESA-60312	European Workshop Environmental Sciences and Management	12.00	RO1	M1/2	1WD, 6WD
YMC-60303	Modular Skills Training	3.00	RO2	M1/2	1AF, 2AF, 3AF, 5AF, 6AF
YMC-60809	Academic Consultancy Training	9.00	RO2	M1/2	1WD, 2WD, 3MO+4WD, 5WD, 6WD
ESA-20806	Principles of Environmental Sciences	6.00	RO3	M1	1AF, 4WD
YRM-20306	Research Methods in Environmental Science	6.00	RO3	M1	1MO, 2MO
Choice of 1 cluster from RO1 - RO2; 1 or 2 courses from RO3 need to be chosen if the study adviser deems it necessary					

<i>Supporting courses</i>					
MAT-14903	Mathematics 2	3.00	RO4	M1	1AF
MAT-23306	Multivariate Mathematics Applied	6.00	RO4	M1	1AF
MAT-14303	Basic Statistics	3.00	RO4	M1	1MO
MAT-15003	Mathematics 3	3.00	RO4	M1	2AF
MAT-20306	Advanced Statistics	6.00	RO4	M1	2AF
LAW-23306	Sustainable Development Law	6.00	RO4	M1	3WD
SOQ-33806	Environmental Analytical Techniques	6.00	RO4	M1	3WD
MAT-22306	Quantitative Research Methods and Statistics	6.00	RO4	M1	3WD, 4WD
1 or more supporting courses from RO4 need to be chosen if the study adviser deems it necessary					

<i>Major Environmental Systems Analysis</i>					
ESA-22806	Environmental Systems Analysis: Methods and Applications	6.00	RO5	M1	2AF
ESA-31806	Environmental Assessments for Pollution Management	6.00	RO5A	M1	3WD
ESA-31306	Integrated Ecosystem Assessment in Regional Management	6.00	RO5A	M1	5MO
ESA-70424	MSc Internship Environmental Systems Analysis	24.00	RO5	M1/2	1,2,3,4,5,6
ESA-80436	MSc Thesis Environmental Systems Analysis	36.00	RO5	M2	1,2,3,4,5,6
Choice of 1 course from RO5A					

<i>Major Aquatic Ecology and Water Quality Management</i>					
SOQ-22306	Chemical Processes in Soil, Water, Atmosphere	6.00	RO6A	M1	2MO
AEW-31306	Water Quality	6.00	RO6B	M1	4WD
AEW-30806	Chemical Stress Ecology and Risk Assessment	6.00	RO6B	M1	5AF
AEW-20706	Practical Aquatic Ecology and Water Quality	6.00	RO6B	M1	6WD
AEW-70424	MSc Internship Aquatic Ecology and Water Quality Management	24.00	RO6	M1/2	1,2,3,4,5,6
AEW-80436	MSc Thesis Aquatic Ecology and Water Quality Management	36.00	RO6	M2	1,2,3,4,5,6
Choice of 2 courses from RO6B; RO6A needs to be chosen if the study adviser deems it necessary					

<i>Major Soil Chemistry and Chemical Soil Quality</i>					
SOQ-22306	Chemical Processes in Soil, Water, Atmosphere	6.00	RO7A	M1	2MO
SOQ-33806	Environmental Analytical Techniques	6.00	RO7	M1	3WD
SOQ-34806	Applications in Soil and Water Chemistry	6.00	RO7	M1	4WD
SOQ-21306	Soil Pollution and Soil Protection	6.00	RO7B	M1	5AF
SOQ-21806	Soil Quality	6.00	RO7B	M1	5MO
SOQ-35306	The Carbon Dilemma	6.00	RO7B	M1	5MO
SOQ-70424	MSc Internship Soil Quality	24.00	RO7	M1/2	1,2,3,4,5,6
SOQ-81336	MSc Thesis Soil Chemistry and Chemical Soil Quality	36.00	RO7	M2	1,2,3,4,5,6
Choice of 1 course from RO7B; RO7A needs to be chosen if the study adviser deems it necessary					

<i>Major Soil Biology and Biological Soil Quality</i>					
SOQ-32806	Biological Interactions in Soil	6.00	RO8	M1	2AF
SOQ-22306	Chemical Processes in Soil, Water, Atmosphere	6.00	RO8A	M1	2MO
SOQ-21806	Soil Quality	6.00	RO8B	M1	5MO
SOQ-35306	The Carbon Dilemma	6.00	RO8B	M1	5MO
SOQ-70424	MSc Internship Soil Quality	24.00	RO8	M1/2	1,2,3,4,5,6
SOQ-81336	MSc Thesis Soil Biology and Biological Soil Quality	36.00	RO8	M2	1,2,3,4,5,6
Choice of 1 course from RO8B; RO8A needs to be chosen if the study adviser deems it necessary					

<i>Major Air Quality and Atmospheric Chemistry</i>					
MAQ-34806	Atmospheric Composition and Air Quality	6.00	RO9	M1	2AF
SOQ-22306	Chemical Processes in Soil, Water, Atmosphere	6.00	RO9A	M1	2MO
MAQ-21806	Meteorology and Climate	6.00	RO9	M1	3WD
MAQ-71324	MSc Internship Air Quality and Atmospheric Chemistry	24.00	RO9	M1/2	1,2,3,4,5,6
MAQ-81336	MSc Thesis Air Quality and Atmospheric Chemistry	36.00	RO9	M2	1,2,3,4,5,6
RO9A needs to be chosen if the study adviser deems it necessary					

<i>Major Environmental Toxicology</i>					
SOQ-22306	Chemical Processes in Soil, Water, Atmosphere	6.00	RO10A	M1	2MO
CBI-20306	Cell Biology and Health	6.00	RO10A	M1	3WD
TOX-30806	Environmental Toxicology	6.00	RO10	M1	5MO
TOX-70424	MSc Internship Toxicology	24.00	RO10	M1/2	1,2,3,4,5,6
TOX-80436	MSc Thesis Toxicology	36.00	RO10	M2	1,2,3,4,5,6
1 Course from RO10A needs to be chosen if the study adviser deems it necessary					

<i>Major Integrated Water Management</i>					
LDD-30306	Sustainable Watershed Management	6.00	RO11A	M1	1AF
ESS-33806	Integrated Water Management	6.00	RO11	M1	2AF
ENP-37306	Water Governance: Concepts and Practices	6.00	RO11	M1	3WD
RDS-35306	Natural Hazards and Disasters	6.00	RO11A	M1	5MO
ESS-70824	MSc Internship Integrated Water Management	24.00	RO11	M1/2	1,2,3,4,5,6
ESS-80836	MSc Thesis Integrated Water Management	36.00	RO11	M2	1,2,3,4,5,6
Choice of 1 course from RO11A					

<i>Major Environmental Policy</i>					
ENP-34306	Environmental Policy: Analysis and Evaluation	6.00	RO12A	M1	2MO
ENP-31306	Sustainable Technology Development	6.00	RO12B	M1	3WD
ENP-30306	International Environmental Policy	6.00	RO12B	M1	4WD
ENP-32806	Sociological Perspectives on Environmental Change	6.00	RO12B	M1	5MO
ENP-33306	Environment and Development	6.00	RO12B	M1	5MO
ENP-70424	MSc Internship Environmental Policy	24.00	RO12	M1/2	1,2,3,4,5,6
ENP-80436	MSc Thesis Environmental Policy	36.00	RO12	M2	1,2,3,4,5,6
Choice of 1 course from RO12B; RO12A needs to be chosen if the study adviser deems it necessary					

<i>Major Environmental Economics and Natural Resources</i>					
ENR-21306	Environmental Economics for Environmental Sciences	6.00	RO13A	M1	2MO, 5AF
ENR-31306	Economics and Management of Natural Resources	6.00	RO13B	M1	4WD
ENP-32306	Advanced Environmental Economics and Policy	6.00	RO13B	M1	5AF
DEC-31306	Cost-Benefit Analysis and Environmental Valuation	6.00	RO13B	M1	6WD
ENR-70424	MSc Internship Environmental Economics and Natural Resources	24.00	RO13	M1/2	1,2,3,4,5,6
ENR-80436	MSc Thesis Environmental Economics and Natural Resources	36.00	RO13	M2	1,2,3,4,5,6
Choice of 1 course from RO13B; RO13A needs to be chosen if the study adviser deems it necessary					

<i>Major Environmental Technology</i>					
E'TE-24804	Fundamentals of Environmental Technology	4.00	RO14A	M1	2MO
PCC-21802	Introductory Thermodynamics	2.00	RO14A	M1	2MO
E'TE-30306	Biological Processes for Resource Recovery	6.00	RO14B	M1	4WD
E'TE-30806	Advanced Water Treatment and Re-use	6.00	RO14B	M1	5AF
E'TE-32306	Renewable Energy: Sources, Technology & Applications	6.00	RO14B	M1	5MO
E'TE-70424	MSc Internship Environmental Technology	24.00	RO14	M1/2	1,2,3,4,5,6
E'TE-80436	MSc Thesis Environmental Technology	36.00	RO14	M2	1,2,3,4,5,6
Choice of 2 courses from RO14B; RO14A needs to be chosen if the study adviser deems it necessary					

<i>Minor Environmental Education</i>					
COM-20806	Environmental Communication and Innovation	6.00	RO15A	M1	2AF
COM-23306	Risk Communication	6.00	RO15A	M1	4WD
ECS-31806	Applied Environmental Education and Communication	6.00	RO15	M1	6WD
ECS-70424	MSc Internship Educational Studies	24.00	RO15B	M2	1,2,3,4,5,6
ECS-80424	MSc Thesis Educational Studies	24.00	RO15B	M2	1,2,3,4,5,6
Select a thesis and accompanying preparatory courses from RO5-RO14; choice of 1 subject from RO15B in consultation with the study adviser; 1 course from RO15A needs to be chosen if the study adviser deems it necessary					

<i>Minor Environmental Communication</i>					
COM-20806	Environmental Communication and Innovation	6.00	RO16A	M1	2AF
COM-23306	Risk Communication	6.00	RO16A	M1	4WD
ECS-31806	Applied Environmental Education and Communication	6.00	RO16	M1	6WD
ECS-70424	MSc Internship Educational Studies	24.00	RO16B	M2	1,2,3,4,5,6
ECS-80424	MSc Thesis Educational Studies	24.00	RO16B	M2	1,2,3,4,5,6
Select a thesis and accompanying preparatory courses from RO5-RO14; choice of 1 subject from RO16B in consultation with the study adviser; 1 course from RO16A needs to be chosen if the study adviser deems it necessary					

Master Urban Environmental Management

Course code	Course name	Credit points	CS/RO	Year	Period
<i>Common part</i>					
E'ETE-22806	Principles of Urban Environmental Management	6.00	CS	M1	1AF
YRM-20306	Research Methods in Environmental Science	6.00	RO0	M1	1MO, 2MO
ESA-60312	European Workshop Environmental Sciences and Management	12.00	RO1A	M1	6WD
YMC-60303	Modular Skills Training	3.00	RO1B	M1	1AF, 2AF, 3AF, 5AF, 6AF
YMC-60809	Academic Consultancy Training	9.00	RO1B	M1	1WD, 2WD, 3MO+4WD, 5WD, 6WD
ENP-36806	Governance for Sustainable Cities	6.00	RO2	M1	4WD
E'ETE-32806	Managing Urban Environmental Infrastructure	6.00	RO2A	M1	5MO
LUP-23806	Planning for Urban Quality of Life	6.00	RO2B	M1	2AF
E'ETE-33806	Planning and Design of Urban Space	6.00	RO2B	M1	5AF
Choice of 1 cluster from RO1A and RO1B; choice of 2 courses from RO2, RO2A, and RO2B; RO0 needs to be chosen if the study adviser deems it necessary					

<i>Major Urban Environmental Technology and Management</i>					
E'ETE-25306	Basic Technologies for Urban Environmental Management	6.00	RO3A	M1	2MO
E'ETE-34306	Energy, Water, and Waste Cycles in the Built Environment	6.00	RO3	M1	4WD
E'ETE-70824	MSc Internship Urban Environmental Technology and Management	24.00	RO3	M2	1,2,3,4,5,6
E'ETE-81836	MSc Thesis Urban Environmental Technology and Management	36.00	RO3	M2	1,2,3,4,5,6
RO2A needs to be chosen; RO3A needs to be chosen if the study adviser deems it necessary					

<i>Major Environmental Policy</i>					
ENP-20806	Environmental Management and Industry	6.00	RO4A	M1	1MO
ENP-31306	Sustainable Technology Development	6.00	RO4A	M1	3WD
ENP-32306	Advanced Environmental Economics and Policy	6.00	RO4A	M1	5AF
ENP-70424	MSc Internship Environmental Policy	24.00	RO4	M2	1,2,3,4,5,6
ENP-80436	MSc Thesis Environmental Policy	36.00	RO4	M2	1,2,3,4,5,6
RO2 needs to be chosen; choice of 2 courses from RO4A					

<i>Major Environmental Economics and Natural Resources</i>					
ENR-21306	Environmental Economics for Environmental Sciences	6.00	RO5	M1	2MO
ENP-32306	Advanced Environmental Economics and Policy	6.00	RO5	M1	5AF
ENR-70424	MSc Internship Environmental Economics and Natural Resources	24.00	RO5	M2	1,2,3,4,5,6
ENR-80436	MSc Thesis Environmental Economics and Natural Resources	36.00	RO5	M2	1,2,3,4,5,6

<i>Major Environmental Systems Analysis</i>					
ESA-22806	Environmental Systems Analysis: Methods and Applications	6.00	RO6	M1	2AF
ESA-31806	Environmental Assessments for Pollution Management	6.00	RO6A	M1	3WD
ESA-31306	Integrated Ecosystem Assessment in Regional Management	6.00	RO6A	M1	5MO
ESA-70424	MSc Internship Environmental Systems Analysis	24.00	RO6	M1/2	1,2,3,4,5,6
ESA-80436	MSc Thesis Environmental Systems Analysis	36.00	RO6	M2	1,2,3,4,5,6
Choice of 1 course from RO5A					

<i>Major Geo-information Science and Remote Sensing</i>					
GRS-10306	Introduction Geo-information Science	6.00	RO7A	M1	1MO
GRS-20806	Geo-information Tools	6.00	RO7	M1	2AF
GRS-32806	Spatial Data Infrastructure	6.00	RO7	M1	3WD
GRS-70424	MSc Internship Geo-information Science and Remote Sensing	24.00	RO7	M2	1,2,3,4,5,6
GRS-80436	MSc Thesis Geo-information Science and Remote Sensing	36.00	RO7	M2	1,2,3,4,5,6
RO7A needs to be chosen if the study adviser deems it necessary					

<i>Major Management Studies</i>					
ENP-20806	Environmental Management and Industry	6.00	RO8	M1	1MO
MST-21306	Advanced Management and Marketing	6.00	RO8	M1	3WD
MST-32306	Strategic Change Management and Innovation	6.00	RO8	M1	5AF
MST-70424	MSc Internship Management Studies	24.00	RO8	M2	1,2,3,4,5,6
MST-80436	MSc Thesis Management Studies	36.00	RO8	M2	1,2,3,4,5,6

<i>Major Land Use Planning</i>					
LUP-31806	Reflections on Spatial Planning Practices	6.00	RO9	M1	1MO
LUP-32806	Planning Theory	6.00	RO9	M1	4WD
LUP-70424	MSc Internship Land Use Planning	24.00	RO9	M2	1,2,3,4,5,6
LUP-80436	MSc Thesis Land Use Planning	36.00	RO9	M2	1,2,3,4,5,6
RO2B needs to be chosen					

Appendix 5: Quantitative data regarding the programme

Data on intake, transfers and graduates

Bachelor programme

Drop-outs (VWO-intake)

Cohort	2006	2007	2008	2009	2010	2011
Drop-outs after 1 year (%)	15	33	16	12	5	6
Drop-outs after 2 year (%)	15	33	16	12	5	
Drop-outs after 3 year (%)	15	33	20	12		

Output (VWO-intake)

Cohort	2006	2007	2008	2009	2010	2011
Diploma after 3 years (%)	36	38	19	23		
Diploma after 4 years (%)	64	75	62			
Diploma after 5 years (%)	82	88				
Diploma after 6 years (%)	91					

Output (total intake)

Cohort	2006	2007	2008	2009	2010	2011
Diploma after 3 years (%)	36	44	19	22		
Diploma after 4 years (%)	64	78	62			
Diploma after 5 years (%)	82	89				
Diploma after 6 years (%)	91					

Master programme Environmental Sciences

Cohort	2007	2008	2009
Diploma after 3 years (%)	90	74	88

Master programme Urban Environmental Management

Cohort	2007	2008	2009
Diploma after 3 years (%)	70	80	90

Teacher-student ratio achieved

Bachelor programme

Ratio	12.0
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Master programme Environmental Sciences

Ratio	15.5
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Master programme Urban Environmental Management

Ratio	13.4
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Average amount of face-to-face instruction per stage of the study programme

Contact hours per week

Bachelor programme

Year	1	2	3
Contact hours	17.4	16.7	14.5

Master programme Environmental Sciences

Year	1	2
Contact hours	15.6	1.0

Master programme Urban Environmental Management

Year	1	2
Contact hours	16.2	1.0

Appendix 6: Programme of the site visit

Time	Part	Collocutors
Wednesday 22 May		
09:00 – 11:45	Preparatory meeting including reviewing documents	
11:45 – 12:00	Presentation European workshop	
12:00 – 12:45	Lunch and consultation hour	
12:45 – 13:45	Management of the programme Environmental Sciences and Urban Environmental Management	<ul style="list-style-type: none"> • Prof. dr. T.W.(Thom) Kuyper (personal professor, board member of the Education Institute) • Prof. dr. ir. G. (Grietje) Zeeman (personal professor, chair of the Programme Committee) • Drs. J.J. (Jan) Steen (quality manager, Education Institute) • Ir. P.G.P. (Paul) Geurts (international relations manager, Corporate Education, Research and Innovation) • Ir. Th.M. (Theo) Lexmond (programme director)
13:45 – 14:00	<i>Break</i>	
14:00 – 14:45	Students bachelor Environmental Sciences	<ul style="list-style-type: none"> • W.J.C. (Wouter) Blom (2012) • C.K. (Chandni) Dwarkasing (2010) • K. (Koen) van Gijn (2011) • G.J. (Guusje) Koorneef (2011) • T.K. (Tobias) Seggewiß (2010) • J.A.R. (Jill) Soedarso (2012) • R. (Robin) Smale (2009)
14:45 – 15:30	Lecturers bachelor Environmental Sciences	<ul style="list-style-type: none"> • Dr. B. (Bettina) Bluemling (assistant professor, Environmental Policy) • Dr. ir. J.T.C. (Tim) Grotenhuis (assistant professor, Environmental Technology) • Ir. M.G. (Meindert) Keizer (lecturer, Soil Quality) • Dr. ir. D.P.B.T.B. (David) Strik (assistant professor, Environmental Technology) • Dr. ir. B.G. (Hardy) Temmink (assistant professor, Environmental Technology) • Dr. ir. A.J.H. (Arnold) van Vliet (researcher, Environmental Systems Analysis) • Dr. E.H. (Edwin) van der Werf (assistant professor, Environmental Economics)
15:30 – 15:45	<i>Break</i>	
15:45 – 16:30	Students master Environmental Sciences	<ul style="list-style-type: none"> • T.O. (Tom) Banks (2012) • H.P. (Hein) Heuver (2012) • D.J. (Domingos) Langa (2011) • G. (Gaofeng) Ni (2011) • H.A. (Arnoud) de Wilt (2011)
16:30 – 17:15	Lecturers master Environmental Sciences	<ul style="list-style-type: none"> • Prof. dr. ir. C.J.N. (Cees) Buisman (chair holder, Environmental Technology) • Dr. S.R. (Simon) Bush (associate professor, Environmental Policy) • Ir. K.P.J. (Karen) Fortuin (lecturer, Environmental Systems Analysis) • Dr. ir. A. (Annemiek) ter Heijne (assistant professor, Environmental Technology)

		<ul style="list-style-type: none"> • Prof. dr. ir. E.C. (Ekko) van Ierland (chair holder, Environmental Economics) • Prof. dr. C. (Carolien) Kroeze (personal professor, Environmental Systems Analysis) • Prof. dr. ir. A.P.J. (Arthur) Mol (chair holder, Environmental Policy) • Dr. ir. E.J.J. (Erik) van Slobbe (lecturer/researcher, Earth System Science-Integrated Water Management)
17:15 – 18:00	Alumni Environmental Sciences and Urban Environmental Management	<ul style="list-style-type: none"> • A. (Arjan) Dekker (MSc Environmental Sciences, 2010) • Indra Firmansyah (MSc Urban Environmental Management, 2011) • T. (Tanya) Huizer (MSc Environmental Sciences, 2011) • J. (Joeri) Naus (MSc Environmental Sciences, 2010) • E.M. (Els) Schuman (MSc Environmental Sciences, 2008) • M. (Maryna) Strokhal (MSc Environmental Sciences, 2011) • A.B. (Anna) Veldhoen (MSc Environmental Sciences, 2010)
19:00 –	<i>Dinner</i>	

Thursday 23 May

09:00 – 09:45	Students Urban Environmental Management	<ul style="list-style-type: none">• K.D. (Karla) Lieberg (2012)• K. (Kim) van Sparrentak (2012)• A.W.J. (Alwin) Veldboom (2012)• I.M. (Ilse) Voskamp (2011)• Z. (Ziyou) Wang (2011)
09:45 – 10:30	Lecturers Urban Environmental Management	<ul style="list-style-type: none">• Dr. ir. G.J. (Gerrit-Jan) Carsjens (assistant professor, Land Use Planning)• Dr. K. (Katarzyna) Kujawa-Roeleveld (lecturer, Environmental Technology)• Dr. ir. C.S.A. (Kris) van Koppen (associate professor, Environmental Policy)• Prof. dr. ir. H.H.M. (Huub) Rijnaarts (chair holder, Environmental Technology)• Dr. M. (Marc) Spiller (researcher, Environmental Technology)• Dr. ir. B.J.M. (Bas) van Vliet (assistant professor, Environmental Policy)
10:30 – 10:45	<i>Break</i>	
10:45 – 11:30	Educational Committee	<ul style="list-style-type: none">• Dr. ir. R.A. (Rolf) Groeneveld (assistant professor, Environmental Economics)• Dr. A. (Aarti) Gupta (assistant professor, Environmental Policy)• Dr. ir. N. (Nynke) Hofstra (assistant professor, Environmental Systems Analysis)• Dr. ir. E.T.H.M. (Edwin) Peeters (assistant professor, Aquatic Ecology and Water Quality Management)• N.A. (Niels) van der Linden (BSc Environmental Sciences, 2009)• C.Y. (Coen) de Jong (BSc Environmental Sciences, 2010)• L.F. (Lukas) Schaefer (MSc Urban Environmental Management, 2012)• H.R. (Hein) Tanis (MSc Environmental Sciences, 2011)
11:30 – 12:25	Study advisors and members Examining board including presentation Study Programme Approval	<ul style="list-style-type: none">• Dr. ir. R.J.A. (Ron) van Lammeren (associate professor, chair Examining Board)• Dr. D. (Dick) van der Hoek (assistant professor, secretary Examining Board)• Dr. J. (Judith) van Leeuwen (study advisor)• Drs. M.J. (Marjo) Lexmond (study advisor)
12:25 – 13:00	<i>Break</i>	
13:00 – 13:45	Preparing for the final meeting	
13:45 – 14:45	Final meeting with the management	<ul style="list-style-type: none">• Prof. dr. T.W. (Thom) Kuyper (personal professor, board member of the Education Institute)• Prof. dr. ir. G. (Grietje) Zeeman (personal professor, chair of the Programme Committee)• Drs. J.J. (Jan) Steen (quality manager, Education Institute)• Ir. Th.M. (Theo) Lexmond (programme director)
14:45 – 16:45	Committee meeting	
17:00 – 17:15	Oral presentation by the chairman	
17:15 –	<i>Drinks</i>	

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

841124-574-030	891204-784-080
860421-110-120	900725-941-050
870221-548-040	880424-315-030
880125-486-110	901206-416-110
890617-645-060	880219-748-070

Master programme Environmental Sciences

841207-813-030	840801-786-110
840822-643-050	821124-184-010
830620-841-050	860121-716-090
860507-959-090	810829-759-090
830921-702-130	841124-574-030

Master programme Urban Environmental Management

860725-250-060	801015-262-060
850408-286-130	850825-988-090
870605-484-060	820918-831-070
810513-024-100	811102-720-090
851025-233-110	860101-724-040

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):

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

Appendix 8: Declarations of independence



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;



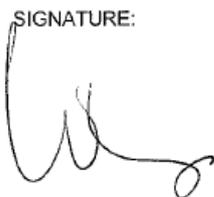
HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

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:




DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: Ivan Janssens

HOME ADDRESS:

JACOBSLAAN 122
2580 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;



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:



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:

QAMU

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;



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:



DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

Prof. Dr. Jochen Monstadt

HOME ADDRESS:

Neuhofstr. 41a, D-60318 Frankfurt

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

BSc. and MSc. programmes in Environmental Studies;

MSc. programme in Urban Environmental Management

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

Wageningen University, NL

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;

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:

DATE:

Frankfurt

06.09.2013

SIGNATURE:

John Howarth



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, Univ. Utrecht University

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

RANU
~~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;



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:

15-03-2013

SIGNATURE:



DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: Annemarie Venemans

HOME ADDRESS: Vondellaan 58
2332 AH Leiden

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;



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: