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Contents

Summary 4
Score table 6
Introduction 7
Procedure 7
Panel 8
Information on the programme 9
Description of the assessment 10
Previous accreditation's panel's recommendations 10
Standard 1. Intended learning outcomes 10
Standard 2. Teaching-learning environment 12
Standard 3. Student assessment 17
Standard 4. Achieved learning outcomes 19
General conclusion 20
Development points 20
Appendix 1. Intended learning outcomes 21
Appendix 2. Programme curriculum 22
Appendix 3. Programme of the site visit 24
Appendix 4. Materials 25

Summary

Standard 1. Intended learning outcomes

Based on the reviewed documents and discussions during the site visit, the panel concludes that the programme has a clear and unique profile. It provides students with a broad overview of perspectives on sustainable development and in-depth knowledge within the Sustainable Development (SD) and Water Science and Management (WSM) specializations, combining natural and social sciences. The panel is positive about the two specializations, Water Science and Management (WSM) and Sustainable Development (SD), the latter with tracks on Energy and Materials, Environmental Change and Ecosystems, Earth System Governance, and a new track on Politics, Ecology, and Society. It values the recent renewal of the SD specialization based on a so-called canon of the relevant theories, methods and skills, the focus on normative dimensions of sustainable development and the increased emphasis on justice, equity and the Global South. The panel supports the current renewal of the WSM specialization, which aims to more clearly differentiate the specialization through a focus on water and climate adaptation and to increase student inflow. The panel recommends using the redesign of the programme towards water and climate adaptation to increase the international focus of the WSM specialization. Furthermore, the programme is highly responsive to contemporary academic and societal debates, due to its strong connections with the professional and societal field. The panel considers the ILOs to be appropriate to an academic master's level and in alignment with expectations in the academic and professional field.

Standard 2. Teaching-learning environment

The panel considers the curriculum to be well-structured and coherent. The curriculum covers all ILOs and provides students with an integrative overview of perspectives on sustainable development through general courses across disciplines, as well as specialized in-depth knowledge of different application fields. The panel appreciates the programme's problem-oriented approach, in which the acquisition of knowledge and skills is intertwined with actual environmental problems. The panel values the focus on group work, particularly in the consultancy project course where students work on actual assignments in a transdisciplinary setting, in interdisciplinary teams. The panel concludes that the development of academic and professional skills is sufficiently addressed in all courses. To further strengthen the coherence of skills development within the curriculum and make this more explicit to students, the panel suggests developing skills learning lines.

The panel appreciates how the curriculum is continually updated in response to developments in the professional and academic field. The ongoing renewal of the curriculum will also improve the alignment with the structure of other programmes in the department: to accommodate students all electives offered by the department will be offered in the same periods. Furthermore, the panel appreciates that students have the opportunity to design their own elective course in the form of a tailor-made course, and that the renewed programme will include a 45 EC master's thesis, with the option to do this in a company as a way to integrate an internship with research.

The panel values the student-centred learning environment, with the focus on small-group, interactive teaching and the high level of student involvement. According to the panel, there is adequate supervision, feedback and support. The courses offer varied teaching methods, including guest lectures to introduce students to different perspectives, projects based on real-life cases, and ample opportunity for peer learning. The programme offers limited space for electives, which the panel understands given the broad scope of the programme and the number of tracks offered.

The feasibility of the programme is in order. Students receive proper information and guidance during the programme, and sufficient extra guidance and support if needed. They appreciate the guidance offered by lecturers and study advisers and find them easily accessible. As some track coordinators appear to be more proactive than others, the panel recommends making explicit what is expected of a track coordinator, to ensure equal support for students in all tracks.

The panel is impressed with the quality of the faculty. They are all didactically qualified and are experts in their field, covering the academic scope of the programme. The lecturers all combine teaching and research and have strong connections with the professional and societal field through their own research activities. Thus, the Copernicus Institute with its societal impact orientation provides an excellent research base and practical input for the programme. The alignment and cohesion of the curriculum and teaching team are ensured by regular meetings and calibration among staff members. The panel sees a positive trend with respect to teachers' perceived high workload, but recommends continued monitoring and evaluation of this workload.

The English-taught programme is internationally oriented, which is reflected in the international community of students and staff. According to the panel, the choice for an English name and language of instruction is well substantiated and in alignment with the international nature of the professional and academic field.

Standard 3. Student assessment

The panel concludes that the assessment system is transparent and well designed. Adequate procedures, such as the four-eyes principle, are in place to ensure and enhance the quality of assessment. The assessment methods used are diverse and appropriate, and include structural formative feedback. The panel appreciates the attention for the coherency of assessment and the strong culture of calibration among teachers, as well as the efforts to realign the standard rubric forms and to look at ways to assess individual contributions to group work. There is a good balance between individual and group assignments, with sufficient attention to skills. In addition, the panel advises the programme to establish uniform rules around preparatory exams. To communicate these clearly to students, the panel recommends including more detailed information about this in the course guides.

The master's thesis covers all ILOs of the programme at an individual level and is always independently assessed by two examiners. The panel considers the thesis assessment procedure to be well thought out. According to the panel, the grades awarded are sufficiently substantiated. There are regular calibration sessions around assessment, with subsequent adjustments as needed, such as the recent modification of the assessment forms. Since the panel noted differences in length of the theses, it urges the programme to establish a guideline for the scope of the master’s thesis. The panel also suggests including a guideline for the development of research methods/models.

According to the panel, the Board of Examiners proactively contributes to the quality of assessment in the programme. It safeguards the quality of assessment in the programme in various ways, including the continuous investigation of potential vulnerabilities in the assessment of courses. In particular, the panel appreciates the recent evaluation of the rubrics and the elaborated proposal for a peer review process to encourage alignment between courses and course assessments.

Standard 4. Achieved learning outcomes

Based on the examination of a selection of 15 theses from the programme, the panel concludes that the level of the theses is appropriate for an academic master’s programme. The theses demonstrate the achievement

of the ILOs. The documentation and interviews show that alumni are generally content with the programme and are well prepared to perform successfully in the professional field.

Score table

The panel assesses the programme as follows:

Master's programme Environmental Sciences	
Standard 1: Intended learning outcomes	meets the standard
Standard 2: Teaching-learning environment	meets the standard
Standard 3: Student assessment	meets the standard
Standard 4: Achieved learning outcomes	meets the standard
General conclusion	positive

Em. prof. dr. J.T.A. (Hans) Bressers, panel chair
C. (Carlijn) Braam, panel secretary
Date: 20 September 2024

Introduction

Procedure

Assessment

On 18 and 19 June 2024, the master's programme Environmental Sciences of Utrecht University was assessed by an independent peer review panel as part of the cluster assessment Environmental Sciences. The assessment cluster consisted of 17 programmes, offered by the institutions Open University, University of Amsterdam, Wageningen University, Delft University of Technology, Radboud University, Vrije Universiteit Amsterdam, University of Groningen, Maastricht University, Leiden University, and Utrecht University. The assessment followed the procedure and standards of the NVAO Assessment Framework for the Higher Education Accreditation System of the Netherlands (September 2018).

Quality assurance agency Academion coordinated the assessment upon request of the cluster Environmental Sciences. Peter Hildering and Jessica van Rossum acted as coordinator and as panel secretaries. Annemarie Venemans, Esther Poort, Anne-Lise Kamphuis, Linda te Marvelde, Carlijn Braam and Jessica van Rossum also acted as secretaries in the cluster assessment. They have been certified and registered by the NVAO. Carlijn Braam acted as panel secretary in the assessment of the master's programme Environmental Sciences of Utrecht University.

Preparation

Academion composed the peer review panel in cooperation with the institutions and taking into account the expertise and independence of the members as well as consistency within the cluster. On 15 December 2023, the NVAO approved the composition of the panel. The coordinator instructed the panel chair on his role in the site visit according to the Panel chair profile (NVAO 2016).

The programme composed a site visit schedule in consultation with the coordinator (see appendix 3). The programme selected representative partners for the various interviews. It also determined that the development dialogue would be made part of the site visit. A separate development report was made based on this dialogue.

The programme provided the coordinator with a list of graduates over the period September 2021 – August 2023. In consultation with the coordinator, the panel chair selected 15 theses of the programme. They took the diversity of final grades and examiners into account, as well as the various specializations and tracks within the Sustainable Development specialization. From the Sustainable Development specialization the panel studied 12 theses (of which 2 of the Energy and Materials track, 2 of the Environmental Change and Ecosystems track, 4 of the Earth System Governance track, 3 of the International Development track and 1 of the Joint International Master in Sustainable Development, in which the programme participated until '20/'21) and 3 theses of the Water Science and Management specialization. Prior to the site visit, the programme provided the panel with the theses and the accompanying assessment forms. It also provided the panel with the self-evaluation report and additional materials (see appendix 4).

The panel members studied the information and sent their findings to the secretary. The secretary collected the panel's questions and remarks in a document and shared this with the panel members. In a preliminary meeting, the panel discussed the initial findings on the self-evaluation report and the theses, as well as the division of tasks during the site visit. The panel was also informed on the assessment framework, the working method and the planning of the site visits and reports.

Site visit

During the site visit, the panel interviewed various programme representatives (see appendix 3). The panel also offered students and staff members an opportunity for confidential discussion during a consultation hour. No consultation was requested. The panel used the final part of the site visit to discuss its findings in an internal meeting. Afterwards, the panel chair publicly presented the preliminary findings.

Report

The secretary wrote a draft report based on the panel's findings and submitted it to the coordinator for peer assessment. Subsequently, the secretary sent the report to the panel for feedback. After processing this feedback, the secretary sent the draft report to the programme in order to have it checked for factual irregularities. The secretary discussed the ensuing comments with the panel chair and changes were implemented accordingly. The panel then finalised the report, and the coordinator sent it to the Faculty of Geosciences of Utrecht University.

Panel

The following panel members were involved in the cluster assessment Environmental Sciences:

- Em. prof. dr. J.T.A. (Hans) Bressers, emeritus professor in Policy Studies and Environmental Policy at the University of Twente (chair);
- Prof. dr. A.C. (Arthur) Petersen, professor in Science, Technology and Public Policy at the University College London (United Kingdom);
- Dr. A.R. (Ana) Vasques, lecturer at the Erasmus University College of Erasmus University Rotterdam;
- Dr. S.E. (Sarah) Cornell, associate professor at the Stockholm Resilience Centre of Stockholm University (Sweden);
- Em. prof. dr. M.C. E. (Rietje) van Dam-Mieras, emeritus professor in Sustainable Development and Innovation of Education at Leiden University, and member of the Top Consortium for Knowledge and Innovation (TKI) Biobased Circular (focus Human Capacity Agenda);
- Dr. ir. T. (Thijs) Bosker, associate professor in Environmental Sciences at Leiden University;
- Prof. dr. ir. S.E. (Siegfried) Vlaeminck, professor in Microbial Cleantech and Environmental Systems Analyses at the Universiteit of Antwerpen (Belgium);
- Prof. dr. M.P.J. (Maarten) Loopmans, professor in Human Geography and Political Ecology at the KU Leuven (Belgium);
- Dr. ir. S.G. (Gerd) Weitkamp, associate professor in Health Geography, Mobility, and Geospatial Technologies at the University of Groningen;
- Prof. dr. P. (Paquita) Perez Salgado, professor in Natural Sciences at the Open Universiteit Nederland;
- Prof. dr. E. (Esther) Turnhout, professor in Science, Technology and Society at the University of Twente;
- Em. prof. dr. ir. J.T. (Hans) Mommaas, emeritus professor in Regional Sustainability Governance at Tilburg University, and chair of the Ecological Authority;
- Dr. P. (Patricia) de Cocq, director Nature & Society at HAS green academy;
- Prof. dr. ir. Z. (Zofia) Lukszo, professor in Smart Energy Systems at the Delft University of Technology;
- M. M. (Marisa) Beunk MSc., alumn (March 2023) of the master's programme Environmental Sciences (Policy Track) of Wageningen University (student member);
- F.O. (Fenna) Oostrum, alumn (September 2023) of the master's programme Environment and Society Studies of Radboud University (student member).

The panel assessing the master's programme Environmental Sciences of Utrecht University consisted of the following members:

- Em. prof. dr. J.T.A. (Hans) Bressers, emeritus professor in Policy Studies and Environmental Policy at the University of Twente (chair);
- Prof. dr. A.C. (Arthur) Petersen, professor in Science, Technology and Public Policy at the University College London (United Kingdom);
- Dr. P. (Patricia) de Cocq, director Nature & Society at HAS green academy;
- Prof. dr. ir. Z. (Zofia) Lukszo, professor in Smart Energy Systems at the Delft University of Technology;
- F.O. (Fenna) Oostrum, alumn (September 2023) of the master's programme Environment and Society Studies of Radboud University (student member).

Information on the programme

Name of the institution:	Utrecht University
Status of the institution:	Publicly funded institution
Result institutional quality assurance assessment:	Positive
Programme name:	Environmental Sciences
CROHO number:	60810
Level:	Master
Orientation:	Academic
Number of credits:	120 EC
Specializations or tracks:	Sustainable Development (tracks: Energy and Materials; Environmental Change and Ecosystems; Earth System Governance, and Politics, Ecology, and Society) Water Science and Management
Location:	Utrecht
Mode(s) of study:	Fulltime
Language of instruction:	English
Submission date NVAO:	1 November 2024

Description of the assessment

Previous accreditation's panel's recommendations

The previous accreditation of the master's programme Environmental Sciences of Utrecht University took place in 2018. In the self-evaluation report of the current assessment, the programme described the actions undertaken in response to the recommendations. Also, several improvements were discussed in the interviews during the site visit. The improvements included introducing three new mandatory courses in the Water Science and Management (WSM) specialization, revising the regulations regarding the teaching qualifications, and organising calibration sessions to discuss assessments of final projects. The panel concludes that the recommendations have been seriously acted upon by the programme and is generally content with the improvement measures taken. For some recommendations, it became clear that the programme is still in the process of addressing these. These issues will be described further on in this report.

Standard 1. Intended learning outcomes

The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

Findings

The master's programme Environmental Sciences (ES) aims to educate students to become sustainability professionals who can contribute to the transition towards sustainable and just societies as change agents. The panel appreciates the programme's inter- and transdisciplinary focus, combining a broad integrative overview of both scientific and stakeholder perspectives on sustainable development with specialized in-depth knowledge on different fields of application. The programme has two specializations: Sustainable Development (SD) and Water Science and Management (WSM). The SD specialization includes four tracks: Energy and Materials; Environmental Change and Ecosystems; Earth System Governance, and a new track on Politics, Ecology, and Society. The last track has replaced the International Development track, to remain up to date with contemporary debates.

Based on the recommendations of the previous accreditation panel and recent developments in politics and society, the programme has been working on an extensive renewal of the curriculum since 2020. The panel learned that in both specializations, the aim is to tailor the programme towards topical developments in the field and labour market. The panel is positive about the specializations. It values the focus of SD on normative dimensions of sustainable development and the increased emphasis on justice, equity and the Global South. In WSM, academic knowledge of the natural sciences is combined with knowledge of water management processes in practical applications. For WSM, the panel recommends using the redesign of the programme towards water and climate adaptation to increase the international focus of the specialization, as some students indicated that WSM is currently very much focused on Dutch engineering companies.

The panel values the combination of multiple natural and social science disciplines in the programme, as well as the attention to the normative perspective of sustainability. To teach students how to deal with complex sustainability challenges, the programme has a clear research orientation, and emphasizes critical thinking and collaboration skills, which was evident throughout the interviews during the site visit. The panel also appreciates how the programme continually reflects on the relevance of the specializations in light of the professional and academic field, as is evidenced by the changes implemented, and to be implemented for WSM. According to the panel, the programme is highly responsive to developments in the dynamic field

and contemporary academic and societal debates, also through its strong connection with the Copernicus Institute.

The panel observed that the programme strives for a diverse inflow of students in order to expose students to a wide variety of perspectives. Many students have backgrounds in social sciences. Entry requirements differ per specialization. In addition to grades in relevant courses, student's motivation is also taken into account. To meet the admission requirements, prospective students can take an entry test for which they can prepare by means of an online learning environment or through other learning materials such as recommended readings or knowledge clips or, in selective cases, enrol in a 30 EC pre-master's programme. According to the programme management a recent renewal of the admission procedure has also led to a better alignment between admission tests and entry requirements. The renewal of the WSM specialization is partly intended to increase the attractiveness of the programme, since student inflow in recent years has become critically low for this specialization, dropping below twenty students per year.

Intended learning outcomes

The programme formulated clear intended learning outcomes (ILOs) for both specializations: six for the SD specialization and five for the WSM specialization. In the self-evaluation report, the ILOs are related to the domain-specific framework for academic programmes in Environment and Sustainability and the Dublin Descriptors. The panel considers the ILOs to be well formulated and appropriate for the academic master's level. They are in accordance with the Dublin Descriptors and the domain-specific framework, and cover all relevant aspects of the master's programme.

According to the panel, the programme is well-connected to the professional field and society as there are many interactions in the context of thesis internships, research projects of teaching staff, guest lectures, the consultancy project course, activities of the study association Storm and contacts with alumni. Further alignment with the field is pursued through the Societal Advisory Board. The panel was pleased to learn that the Advisory Board is involved in the development of the programme, and advises it on developments within the domain as well as the needs of society and the professional field that are relevant to the content of the programme.

Considerations

Based on the reviewed documents and discussions during the site visit, the panel concludes that the programme has a clear and unique profile. It provides students with a broad overview of perspectives on sustainable development and in-depth knowledge within the Sustainable Development (SD) and Water Science and Management (WSM) specializations, combining natural and social sciences. The panel is positive about the two specializations, Water Science and Management (WSM) and Sustainable Development (SD), the latter with tracks on Energy and Materials, Environmental Change and Ecosystems, Earth System Governance, and a new track on Politics, Ecology, and Society. It values the recent renewal of the SD specialization based on a so-called canon of the relevant theories, methods and skills, the focus on normative dimensions of sustainable development and the increased emphasis on justice, equity and the Global South. The panel supports the current renewal of the WSM specialization, which aims to more clearly differentiate the specialization through a focus on water and climate adaptation and to increase student inflow. The panel recommends using the redesign of the programme towards water and climate adaptation to increase the international focus of the WSM specialization. Furthermore, the programme is highly responsive to contemporary academic and societal debates, due to its strong connections with the professional and societal field. The panel considers the ILOs to be appropriate to an academic master's level and in alignment with expectations in the academic and professional field.

Conclusion

The panel concludes that the programme meets standard 1.

Standard 2. Teaching-learning environment

The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

Findings

Curriculum

The programme consists of 120 EC and is offered as a fulltime two-year programme. The panel appreciates that in line with the nature of environmental science topics and labour market requirements, the programme has a problem-oriented approach, in which the acquisition of knowledge and skills takes place on the basis of actual environmental problems. The panel is very positive about the major renewal of the Sustainable Development (SD) specialization. In the panel's opinion, this has resulted in a more clearly structured and coherent curriculum and the strengthening of critical thinking, inter- and transdisciplinarity in the programme. For the Water Science and Management (WSM) specialization, a renewal project was started in 2023 with the main aim of increasing student inflow and to distinguish the WSM specialization more clearly through a focus on water and climate adaptation. This process is intended to result in a new curriculum as of the academic year 2025-2026. The new curriculum will include a Living Lab fieldwork course, which will enable students to work on climate change adaptation challenges in deltas.

The study programme is set up such that students take course modules of 7.5 EC throughout the first year. Two course modules run parallel each period. All students are provided with an integrative overview of perspectives through general courses across disciplines, as well as specialized in-depth knowledge of different application fields. This combination is realized by means of a T-shaped design of the programme. In SD, each application field pays attention to theoretical backgrounds, research methods and intervention methods in four mandatory courses per application field (30 EC in total). Energy and Materials focuses on the transformation to the sustainable use of energy and materials; Environmental Change and Ecosystems on the sustainable use of land and water; Earth System Governance on governing the transformations needed for a sustainable world; and Politics, Ecology and Society on exploring the political implications of ecology and the ecological basis of politics. The WSM specialization programme integrates knowledge from natural and social sciences to address emerging needs in the professional field of water management. Previously, all integrated courses were shared, but this is not the case anymore. Two mandatory initial courses provide a broad integrative overview for all SD students: Perspectives on Sustainable Development, and Systems Thinking, Scenarios and Indicators. The latter is offered as an elective to the WSM students, who take an integrative course on Sustainable Water Resources Management.

The curriculum for both specializations includes mandatory and research design courses (core courses), methodological courses per application field, and specialized courses in the fields of application that are related to important sustainable development challenges. These challenges are also the focus of research programmes within the Copernicus Institute of Sustainable Development. Thus, the panel observes that the programme is well aligned with developments in academic research as well as the teaching staff's research projects. The panel was also pleased to see that data courses have been converted to courses on open source tools.

As sustainability challenges require teamwork, students work on group assignments throughout the programme. The set of mandatory integrative courses is completed by the consultancy project course (7,5 EC), taken by students from both specializations. In this course, students work in a transdisciplinary setting on assignments provided by real-world clients, in interdisciplinary teams with students from different specializations and application fields. During the interview, students expressed appreciation for the consultancy project, which really helps them to develop their writing, presenting and collaboration skills. Students can further develop their knowledge and skills in interdisciplinary settings by participating in extracurricular programmes, such as the Young Innovators Programme.

The second year is devoted to electives and to the master's thesis, in which students perform an individual scientific research project. Depending on the chosen specialization and size of the thesis, there is room for electives (up to 30 EC). To accommodate students, all electives offered by the department will be offered in the same periods, 1 and 2. Furthermore, students have the option to combine their thesis in period 3 with an elective elsewhere. The panel appreciates that students also have the opportunity to design their own elective course in the form of a tailor-made course (7.5 or 15 EC). For this tailor-made course, which can be either theoretically or practically oriented, students write a proposal to be approved by their supervisor and set their own learning objectives, which they reflect on afterwards.

Students can opt for either a 30 EC or a 45 EC thesis. Although the programme does not recognize formal internships, the thesis may be carried out within an organization. The panel sees this as an ideal way to integrate an internship with research. The thesis project includes a research proposal, the written thesis, an oral presentation, and an evaluation of the overall process. The thesis coordinators of the application fields assist students in finding a suitable thesis topic and supervisor. Thesis topics vary from natural science oriented to more social science oriented, but the theses are all related to a topical and socially relevant sustainability-related problem. The panel noted that in congruence with the international character of the programme, a relatively high number of students conduct their research abroad. For WSM, most students perform their thesis project at an internship. In the interview, students informed the panel that adequate information on thesis internships is available on Blackboard. They are also happy with the support they receive from their thesis supervisor(s), although the student chapter mentioned that more support and resources for the thesis would be appreciated and the thesis process could be harmonized between the tracks, for example around the matching process for thesis topics. Again, opinions seem to differ. Motivated students are encouraged to write their thesis in the form of a scientific paper; the panel noted that 57 articles based on a master's thesis have been published in peer-reviewed international journals over the past 5 years.

The panel considers the curriculum to be well-structured and coherent, especially after the recent renewal of the SD specialization, which helps to integrate courses and topics across the curriculum. The curriculum covers all ILOs, as is demonstrated in the tables included in the self-evaluation report. Students indicate that they appreciate the design and content of the programme. As stated in the student chapter, the broadness of the programme sometimes causes repetition and overlap in course content, in particular for students who did the GSS bachelor's programme and for SD students from different tracks who take multiple common courses – although students the panel spoke with saw the benefit of this overlap, as some students have no prior knowledge. The panel noted that this complaint has the attention of the programme. Differences in prior knowledge are dealt with in several ways, for example with preparatory materials, tutorials and extra guidance of students. Course coordinators frequently discuss the course content in staff meetings to ensure alignment between the courses. According to the panel, the curriculum's coherence, focus and alignment with developments in academic research are supported by the fact that the programme is embedded in the Department of Sustainable Development (Copernicus Institute), linked to the Faculty of Geosciences. The panel is very positive about the renewal of the curriculum, which will also improve the alignment with the

structure of other programmes in the department. The panel appreciates how the programme continually reflects on the content of the curriculum in light of the professional and academic field. This responsive attitude is also reflected in the ongoing incremental changes implemented in the courses.

The programme representatives clarified that skills development throughout the programme is specifically addressed in the renewal process, which the panel appreciates. The panel recommends that the programme considers developing skills learning lines as a 'finishing touch', to strengthen and highlight the already existing attention to skills in all courses. Adding learning lines could contribute to the coherence of skills development in relation to the ILOs, and make this more explicit for students.

Learning environment
In line with Utrecht University's educational guidelines, the programme stimulates active and student-centred learning. The courses combine lectures with teaching methods that help activate students, such as debates, paper writing and assignments focusing on the training of specific skills, including data analysis, research design, computer simulation and presenting. Students indicated that they like the room for open discussion and dialogue during lectures and tutorials. The curriculum is geared towards getting students to recognize the importance of working together on tackling sustainability challenges; in various group assignments, they learn to work in (interdisciplinary) teams on a challenge-based task. The panel values the student centredness of the programme, with the focus on small-group teaching and adequate supervision, feedback and support. It offers varied teaching methods including guest lectures to introduce students to different perspectives, an adequate balance of individual and group activities, and ample opportunity for peer learning. The programme offers limited space for electives, which the panel understands given the broad scope of the programme, although some students would like to see more opportunities for specialization. The panel is positive about the learning environment, providing good facilities and space for the development of an academic community. In addition, the panel recognizes the high level of student involvement, reinforced by the very active study association Storm.

Feasibility
The self-evaluation report shows that less than half of the students graduate within two years. After three years, the graduation rate is around 80%. After studying the curriculum, student chapter and the interview with students during the site visit, the panel concludes that the programme is feasible within two years. As mentioned in the student chapter, the students find the study load for SD manageable, albeit not always evenly distributed across periods and at times not challenging enough. For WSM, the initial study load is called challenging. As these remarks are not reflected in the graduation rates, since these are substantially higher for WSM than for SD, the panel does not draw any conclusions from this.

Guidance
The panel is positive about the guidance and information students receive during the programme and welcomes the provision of programme-specific services and facilities. These include master's information sessions twice a year for prospective students to support their study choice process, and an introductory programme for first-year students. Furthermore, these include an introductory programme for first-year students, a plenary introduction to the setup and objective of the student advisory service and dedicated meetings about the master's thesis and student evaluations. The study association Storm takes an active role as well. The study association organizes a variety of academic- and career-related events as well as social activities, and serves as the link between students, teachers and alumni.

The panel appreciates that lecturers have a personal approach and are dedicated and responsive towards students. The panel noted that student satisfaction about the role of and contact with the track coordinators

varies. In the interview, students indicated that some coordinators are more proactive than others. They would prefer to see more evenly distributed guidance for the different tracks. The panel recommends making explicit what is expected of a track coordinator, to ensure equal support for students in all tracks. Besides the supervision and guidance from the lecturers in the courses, extra support and guidance is available for students. Study advisers are the students' first points of contact when they have individual questions and concerns. If necessary, they can refer students to the specialist services of the university. Students appreciate the guidance offered by study advisers and find them easily accessible. The e-learning platform Blackboard is an important source of information for students. Here, general information is provided regarding entrance requirements for courses, results of course evaluations, news and updates, etc.

Teaching staff

The programme is taught by lecturers from the Copernicus Institute of Sustainable Development who combine teaching and research. The Environmental Sciences section of the Institute has a multidisciplinary research and teaching group of around 80 people: 40 scientific staff, 5 postdocs, and 35 PhD candidates. Courses are coordinated by a tenured staff member. Additional staff members (junior lecturers and junior assistant professors, 10% of the teaching staff) are sometimes involved in teaching, as well as postdocs and PhD students. The panel is impressed with the quality of the lecturers, who are all experts in their fields, thus providing a clear link between research and teaching and ensuring that state-of-the-art knowledge is taught in the programme. According to the panel, the institute with its societal impact orientation provides an excellent research base and practical input for teaching in the master's programme. Students also highly appreciate the quality and up-to-date knowledge of the teaching staff. The panel notes that teaching quality is ensured through an academic development policy that focuses on both teaching and research qualifications. The department expects temporary teaching staff to take part in the university-wide 'Start to teach' programme. All tenured staff (71%) are required to hold or obtain the University Teaching Qualification (UTQ). The panel appreciates that in addition, several staff members have taken the intensive Educational Leadership Programme offered by the Centre for Academic Teaching and Learning (CAT), to further improve their teaching skills.

In the interviews, the panel has seen a very experienced and engaged team that covers the academic scope of the programme. Moreover, the lecturers have strong connections with the professional and societal field through their own research activities. The panel is positive about the calibration among staff members; between lecturers regular meetings take place to ensure the alignment and coherence in the curriculum and to discuss teaching practices. Regarding the perceived high workload of teachers, the panel learned that the programme's management has taken several measures to improve this persistent problem, for example by hiring new staff, deploying assistants and reducing the number of feedback moments per course. The panel sees this as a positive development, but strongly recommends continued attention to and evaluation of teacher workload.

Internationalization

The programme has an inherently international orientation, as the environmental science field has a global character and increasingly international labour market. The panel supports the choice and underlying argumentation for an English-taught programme. According to the panel, this aligns well with the international nature of the professional and academic field. Approximately 40% of the academic staff are non-Dutch, as well as 36% (WSM) to 51% (SD) of the students. Through the international focus, students are exposed to different perspectives and gain experience in collaborating within international teams. The panel also appreciates the availability of exchange programmes for electives, internship and/or thesis at a wide variety of partner universities. The university has adequate professionalization policies in place for ensuring lecturers' proficiency in English.

Considerations

The panel considers the curriculum to be well-structured and coherent. The curriculum covers all ILOs and provides students with an integrative overview of perspectives on sustainable development through general courses across disciplines, as well as specialized in-depth knowledge of different application fields. The panel appreciates the programme's problem-oriented approach, in which the acquisition of knowledge and skills is intertwined with actual environmental problems. The panel values the focus on group work, particularly in the consultancy project course where students work on actual assignments in a transdisciplinary setting, in interdisciplinary teams. The panel concludes that the development of academic and professional skills is sufficiently addressed in all courses. To further strengthen the coherence of skills development within the curriculum and make this more explicit to students, the panel suggests developing skills learning lines.

The panel appreciates how the curriculum is continually updated in response to developments in the professional and academic field. The ongoing renewal of the curriculum will also improve the alignment with the structure of other programmes in the department: to accommodate students all electives will be offered in the same periods. Furthermore, the panel appreciates that students have the opportunity to design their own elective course in the form of a tailor-made course, and that the renewed programme will include a 45 EC master's thesis, with the option to do this in a company as a way to integrate an internship with research.

The panel values the student-centred learning environment, with the focus on small-group, interactive teaching and the high level of student involvement. According to the panel, there is adequate supervision, feedback and support. The courses offer varied teaching methods, including guest lectures to introduce students to different perspectives, projects based on real-life cases, and ample opportunity for peer learning. The programme offers limited space for electives, which the panel understands given the broad scope of the programme and the number of tracks offered.

The feasibility of the programme is in order. Students receive proper information and guidance during the programme, and sufficient extra guidance and support if needed. They appreciate the guidance offered by lecturers and study advisers and find them easily accessible. As some track coordinators appear to be more proactive than others, the panel recommends making explicit what is expected of a track coordinator, to ensure equal support for students in all tracks.

The panel is impressed with the quality of the faculty. They are all didactically qualified and are experts in their field, covering the academic scope of the programme. The lecturers all combine teaching and research and have strong connections with the professional and societal field through their own research activities. Thus, the Copernicus Institute with its societal impact orientation provides an excellent research base and practical input for the programme. The alignment and cohesion of the curriculum and teaching team are ensured by regular meetings and calibration among staff members. The panel sees a positive trend with respect to teachers' perceived high workload, but recommends continued monitoring and evaluation of this workload.

The English-taught programme is internationally oriented, which is reflected in the international community of students and staff. According to the panel, the choice for an English name and language of instruction is well substantiated and in alignment with the international nature of the professional and academic field.

Conclusion

The panel concludes that the programme meets standard 2.

Standard 3. Student assessment

The programme has an adequate system of student assessment in place.

Findings

Assessment system

Assessment in the programme is aligned with the Education and Examination Regulations and Utrecht University's educational model, which includes formative feedback on draft papers and assignments. In a programme-specific assessment plan all assessments and courses are aligned to the ILOs of the programme. This plan includes assessment matrices for each course. This allows programme management, the director of education and the Board of Examiners to systematically review the various assessment forms used in individual courses. ILOs are tested based on a variety of assessment methods, including written exams, research papers, written assignments, poster presentations and oral presentations. Intermediate tests and assessments are used to activate students' learning behaviour and to monitor students' progress. The panel was pleased to learn that in most courses, the final grade is based on a combination of individual and group performances; these courses include at least 50% individual work. The consultancy project course includes peer feedback (peer grading). The panel observed that the assessment of group work is sometimes perceived as failing to recognize individual contributions, while the quality of this work co-determines individual grades. It appreciates that this has the attention of the programme. The aim is to develop and implement methods to assess individual contributions to group work, for example through weekly assessments.

The panel considers the assessment system to be well-designed and coherent, with assessment methods that are appropriate for the courses' learning goals and sufficient attention to skills. It appreciates the assessment plan linked with the ILOs, the policy of continuous assessment and the diversity in assessment methods used. The panel observes that appropriate procedures are in place to ensure and enhance the quality of assessment. For example, the four-eyes principle is applied to the development of exams and assignments. Furthermore, the panel notices a strong culture of calibration among teachers, ensuring consistency in grading of assignments, exams and theses. The programme uses standard rubric grading forms, which are checked by programme management.

Based on the student chapter, the panel had some questions regarding the alignment of assessments and content of the courses, and the transparency of assessment criteria. The panel was informed that for all courses, assessment rubrics are published in the course guide. Also, students indicated during the interview that they experience transparency and alignment around assessments and grading, and expectations are clear. The panel also learned that preparatory exams differ per course. Some courses provide material from multiple years, while others do not offer mock exams. The panel sees some room for improvement, in the sense that it is recommendable to make a deliberate choice about when to include preparatory exams and to provide this information to students in the course guides. According to the panel, overall, students are adequately informed about examinations and assessment criteria.

Thesis assessment

The final product of the programme is the master's thesis of 30 EC or 45 EC, which covers all intended learning outcomes at an individual level. As part of the accreditation process, the panel reviewed a selection of 15 theses from the programme covering the various specializations and tracks, including the corresponding assessment forms. The rubric for the thesis specifies the assessment criteria based on the ILOs, and serves as a basis for grading. The panel concludes that the rubric is actively used. Most assessment

forms are elaborately filled out, providing students with detailed feedback on their thesis. The panel agrees with the grades awarded to the theses and considers the grades to be sufficiently substantiated. In general, the theses are of good quality. As the panel noted that the length of theses varies greatly, the panel recommends that a guideline be established for the scope of the thesis (per track), which can only be deviated from with proper justification.

The panel considers the thesis assessment procedure to be well thought out. If data collection for the thesis is carried out elsewhere, in a company or abroad, the student has both an external supervisor and a supervisor at the UU, who has overall responsibility for supervision and grading. The proposal and thesis are individually assessed by the supervisor and a second independent assessor, who is not involved in the daily supervision of the student. The supervisor also assesses the overall thesis process, while the oral presentation is jointly assessed by both assessors. If necessary, a third assessor is appointed. The assessments of the theses are evaluated by the Board of Examiners in a stratified random manner. The panel was pleased to learn that the way assessment forms are filled out is discussed regularly during calibration sessions and was the subject of extensive discussion with the Board of Examiners. In response to a request by the Board of Examiners, the assessment form has been modified and now makes explicit that if an item in the rubric has been assessed as 'unacceptable', the student has to repair the thesis. Furthermore, the panel observed that around 17% of the graduates were awarded the distinction cum laude over the entire evaluation period. In the interview, programme representatives agreed with the panel that this is a fairly high percentage. The panel is content that they keep an eye on the upward trend in order to prevent 'inflation'.

Board of Examiners

The programme falls under the responsibility of the faculty-wide Board of Examiners. Based on the documentation and the interviews during the site visit, the panel concludes that the Board of Examiners adequately safeguards the quality of assessment in the programme. The Board of Examiners is competent and well aware of current issues and developments, such as artificial intelligence. The Board of Examiners proactively controls the quality of assessment in various ways, such as appointing examiners (holding a UTQ), approving the thesis assessment form, organizing validation meetings in which the grades of theses are discussed, and monitoring cum laude rates. The Committee of Assessments, which advises the Board of Examiners, was involved in an extensive evaluation of the rubrics. This resulted in the recent improvement of assessment forms. The committee also recently completed a proposal for an intervision (peer review) procedure regarding the alignment between courses and course assessments, which will be discussed by the Faculty Board before implementation. The panel is pleased to see that the Board of Examiners clearly contributes to the quality of assessment in the programme and is continuously investigating potential vulnerabilities in the assessment of courses.

Considerations

The panel concludes that the assessment system is transparent and well designed. Adequate procedures, such as the four-eyes principle, are in place to ensure and enhance the quality of assessment. The assessment methods used are diverse and appropriate, and include structural formative feedback. The panel appreciates the attention for the coherency of assessment and the strong culture of calibration among teachers, as well as the efforts to realign the standard rubric forms and to look at ways to assess individual contributions to group work. There is a good balance between individual and group assignments, with sufficient attention to skills. In addition, the panel advises the programme to establish uniform rules around preparatory exams. To communicate these clearly to students, the panel recommends including more detailed information about this in the course guides.

The master's thesis covers all ILOs of the programme at an individual level and is always independently assessed by two examiners. The panel considers the thesis assessment procedure to be well thought out. According to the panel, the grades awarded are sufficiently substantiated. There are regular calibration sessions around assessment, with subsequent adjustments as needed, such as the recent modification of the assessment forms. Since the panel noted differences in length of the theses, it urges the programme to establish a guideline for the scope of the master's thesis. The panel also suggests including a guideline for the development of research methods/models.

According to the panel, the Board of Examiners proactively contributes to the quality of assessment in the programme. It safeguards the quality of assessment in the programme in various ways, including the continuous investigation of potential vulnerabilities in the assessment of courses. In particular, the panel appreciates the recent evaluation of the rubrics and the elaborated proposal for a peer review process to encourage alignment between courses and course assessments.

Conclusion

The panel concludes that the programme meets standard 3.

Standard 4. Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings

Theses

The thesis is regarded as the programme's final project in which students demonstrate that they achieved the programme's ILOs at an individual level. In preparation for the site visit, the panel examined a selection of 15 theses. In the selection, a proper distribution across grades, specializations and tracks was ensured. In the opinion of the panel, the level of the examined theses is appropriate for an academic master's programme. The theses demonstrate the achievement of the ILOs. In general, the theses are of good quality. The panel is impressed by the programme's high cum laude figures.

Alumni

The panel appreciates how students are stimulated through numerous activities to become more acquainted with the future labour market. These include the consultancy project, guest lectures, mutual research projects, thesis internships, and career-related events organized by study association Storm. Career orientation is further supported by Geosciences Career Services and a dedicated career officer. An alumni survey (2021) shows that Environmental Sciences graduates are in high demand; most graduates actively looking for a job find employment within one year (92% of SD graduates and 97% of WSM graduates), mostly in consultancy, research, NGOs, education and government. About 5% of the students continued as PhD students at UU or other universities after graduation. The panel is positive about the fact that the majority of alumni (89%) found professional positions that match the programme's content and level.

As they indicated during the site visit and in the most recent alumni survey, alumni developed valuable knowledge and skills during the programme and feel well prepared for the labour market, in particular thanks to the multidisciplinary teamwork. Employers value graduates for their analytical, problem-solving, communication, teamwork and interdisciplinary skills. Based on the documentation and the interviews during the site visit, the panel concludes that alumni are generally content about the programme and often get relevant positions after graduation. Furthermore, the panel appreciates the programme's plans to

substantiate and solidify the relationship with alumni, for example through a more structural role in education, as advisors for and ambassadors of the programme.

Considerations

Based on the examination of a selection of 15 theses from the programme, the panel concludes that the level of the theses is appropriate for an academic master's programme. The theses demonstrate the achievement of the ILOs. The documentation and interviews show that alumni are generally content with the programme and are well prepared to perform successfully in the professional field.

Conclusion

The panel concludes that the programme meets standard 4.

General conclusion

The panel's assessment of the master's programme Environmental Sciences is positive.

Development points

1. Use the redesign of the WSM programme towards water and climate adaptation to increase the international focus of the specialization.
2. Develop skills learning lines to strengthen and highlight the existing attention to skills in all courses, and to contribute to the coherence of skills development, while at the same time making this more explicit for students.
3. Make explicit what is expected of a track coordinator, to ensure equal support for students in all tracks.
4. Continue to monitor and evaluate the workload of teachers.
5. Establish uniform rules for preparatory exams, and provide more detailed information about this for students in course guides.
6. Establish a guideline for the scope of the master's thesis.

Appendix 1. Intended learning outcomes

Sustainable Development specialisation
The graduate:
1. Is able to analyse the issue of sustainable development from natural science and social science perspectives.
2. Has the ability to apply knowledge and research methods and problem-solving abilities in broader contexts related to sustainable development.
3. Is able to design and carry out natural scientific or social scientific research on the issue of sustainable development in a creative and independent way.
4. Can formulate fundamental critiques of the scientific work of others and can engage in a scientific debate on the issue of sustainable development based on specialised and broader academic knowledge, as well as ethical considerations.
5. Is able to apply knowledge and understanding in such a way that he or she demonstrates a professional approach to their work.
6. Is able to communicate conclusions, as well as the knowledge, reasons and considerations underlying these conclusions, to an audience of specialists and non-specialists

Water Science and Management specialisation
The graduate:
1. Is able to analyse technical and societal issues and the relations between them, relevant to contemporary and future water management aimed at sustainable development.
2. Is able to understand, and perform basic calculations on, natural and technical processes related to water quantity and water quality issues.
3. Is able to design, carry out and report on scientific research on the issue of water management in a creative and independent way.
4. Is able to engage in a scientific, social, and administrative debate on the issue of water management.
5. Is able to communicate on the issue of water management verbally and in writing to a wide audience of water specialists and non-specialists alike.

Appendix 2. Programme curriculum

Sustainable Development specialisation

YEAR 1 Sustainable Development		
PERIOD 1	Perspectives on Sustainable Development, GEO4-2301	EM - Tools for E&M Analysis, GEO4-2326 ECE - Global Environmental Change GEO4-2310 ESG - Foundations of ESG Research, GEO4-2306 ID - Development Themes, GEO4-3510
PERIOD 2	Systems thinking, Scenarios & Indicators for SD, GEO4-2331	EM - Squaring the Circular Economy (GEO4-2338) ECE - Integrated Assessment of Climate Change (GEO4-2340) ESG - Governance Theories, GEO4-2332 ID - Natural Resources Management and Society, GEO4-2339
PERIOD 3	Research Design SD, GEO4-2314	EM - Energy Supply Technologies, GEO4-2312 ECE - Environmental Systems Analysis, GEO4-2303 ESG - Research Strategies ESG, GEO4-2304 ID - Advanced MT for SD-ID, GEO4-3521
PERIOD 4	Consultancy Project SUSD and WSM, GEO4-2008	EM - Policies for E&M Transitions, GEO4-2311 ECE - Quantifying Ecosystem Resilience to Global Environmental Change, GEO4-2341 ESG - Analysing Governance Practices, GEO4-2328 ID - Field Research Practical, GEO4-2342

YEAR 2 Sustainable Development	
PERIOD 1- 4	Free electives (15 EC) Master's thesis SD, GEO4-2321 (30 EC) and choice 1 of 2: Extended thesis, GEO4-2322 (15 EC) or extra free electives (15 EC)

The programme schedule consists of two semesters, each consisting of two blocks. In each block 2 courses of 7,5 EC are followed, each running half-time over about 10 weeks.
The programme consists of a general part, which is mandatory for all students, and of tracks, in which students specialise in a particular direction.

The general part consists of the following mandatory courses (total 30 EC):
1. Perspectives on Sustainable Development (GEO4-2301)
2. Systems Thinking, Scenarios & Indicators for SD (GEO4-2331)
3. Research Design SD (GEO4-2314)
4. Consultancy Project SUSD and WSM (GEO4-2008)

In addition to the general courses each student pursues a specialisation track. The programme offers the following four tracks:
- Energy and Materials
- Environmental Change and Ecosystems
- Earth System Governance
- International Development

The tracks build on knowledge derived from various disciplines in the natural and social sciences. On these foundations interdisciplinary knowledge is built. Each track pays attention to different theoretical backgrounds, research methods and intervention methods. This is done in four mandatory courses per track (total 30 EC).
Students can broaden or deepen that basis with elective courses (15 EC) that are part of the other tracks (taking the prerequisite prior knowledge into account), or courses from other Master's programmes. The Board of Examiners must approve the choice of certain elective courses.

Water Science Management specialisation

YEAR 1 Water Science Management		
PERIOD 1	Sustainable Water Resources Management, GEO4-6008	Principles of Groundwater Flow, GEO4-1434
PERIOD 2	Quantitative Water Management, GEO4-6001	Choice 1 of 2: Systems Thinking, Scenarios & Indicators for SD (GEO4-2331) or Unsaturated Zone Hydrology, GEO4-4417
PERIOD 3	Water, Governance and Law, GEO4-6002	Water Quality Management, GEO4-6007
PERIOD 4	Consultancy Project SUSD and WSM, GEO4-2008	Research in WSM, GEO4-6009

YEAR 2 Water Science Management		
PERIOD 1	Drinking Water and Sanitation, GEO4-6003	Land Surface Hydrology, GEO4-4404
PERIOD 2 - 4	Choice 1 of 2: Master's thesis (30 EC), GEO4-6004 and electives (15 EC) or Master's thesis (45 EC), GEO4-6006	

Appendix 3. Programme of the site visit

Tuesday 18 June 2024

13:00		Arrival committee
13:00	13:45	Preparations committee
13:45	14:30	Vice-dean and programme management
14:30	14:45	Break
14:45	15:15	GSS Bachelor students
15:15	15:30	Break
15:30	16:00	Environmental Sciences Master students
16:00	16:30	Energy Science Master students

Wednesday 19 June 2024

09:00		Arrival committee
09:15	09:45	Alumni (online)
09:45	10:00	break
10:00	10:30	GSS Bachelor lecturers and study advisor
10:30	10:45	Break
10:45	11:15	Environmental Sciences Master lecturers and study advisor
11:15	11:30	Break
11:30	12:00	Energy Science Master lecturers and study advisor
12:00	13:15	Lunch break
13:15	14:00	Board of Examiners
14:00	14:30	Break
14:30	15:15	Vice-dean and programme management
15:15	16:45	Deliberations panel
16:45	17:00	Main findings presented by panel chair
17:30	18:15	Development dialogue

Appendix 4. Materials

Prior to the site visit, the panel studied 15 theses of the master's programme Environmental Sciences. Information on the theses is available from Academion upon request. The panel also studied other materials, which included:

- Self-evaluation report, including the following appendices:
    - Organisation of the programme
    - Follow up actions previous assessments
    - Domain-Specific Framework of Reference
    - Overview of the intended learning outcomes in relation to the Dublin descriptors and the domain-specific framework of reference
    - Key figures – source OSIRIS
    - Overview staff
    - Titles master's theses SD and WSM specialisation
    - Members Advisory Board of the Copernicus Institute
    - Course calendars 2022 – 2023
    - Course guide
    - Institutional quality assurance assessment
    - Assessment plan
    - Annual evaluations
    - Outflow students to labour market
    - Activities to prepare students for the labour market
    - Thesis based publications
    - SD specialisation – Canon
    - Renewed curriculum specialisation Water Science and Management
- Staff-student ratio
- Theses and rubrics
- Alumni survey (report 2021)
- Annual report Examining Board 2022-2023
- Quality assurance report Geosciences 2024
- Agenda meetings Societal advisory board Copernicus Institute of Sustainable Development