



B Environmental Sciences
Wageningen University

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Project code P2304

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Summary

Standard 1. Intended learning outcomes

The panel highly appreciates the programme's profile, which focuses on equipping students with a comprehensive understanding of environmental challenges. Its interdisciplinary approach and specialized tracks allow students to tailor their education while developing a solid foundation in both natural and social sciences. The programme's strong research orientation and emphasis on systems thinking and problem-solving, prepare students to effectively navigate rapidly evolving environmental challenges.

The interdisciplinary profile of the programme is reflected in eighteen intended learning outcomes (ILOs) which align with the Dublin descriptors for bachelor's programmes and the expectations in the professional field.

Standard 2. Teaching-learning environment

The panel confirmed that the curriculum enables students to attain the intended learning outcomes. Aligned with its objectives, the curriculum provides a broad interdisciplinary programme covering various environmental sciences topics. The core component of the programme consists of a comprehensive set of courses that not only cultivate detailed analytical skills but also promote a broad contextual understanding. According to the panel, a significant asset of the curriculum is the flexibility it provides for students to specialize in specific areas, along with ample opportunities to pursue their individual academic and career goals. The panel endorses the decision to offer the programme in English as an international programme. The international classroom prepares students to navigate diversity in nationalities, cultures, and perspectives.

The programme effectively employs various teaching methods, facilitating personalized learning through a combination of large-scale lectures and small-group tutorials. The panel highly regards the practical experiences offered by laboratory and field studies, enabling students to engage with real clients in project-based studies. The programme is feasible, and students receive adequate support and guidance to create their study path.

The programme is taught by a diverse group of teachers who are involved in multiple programmes. Generally, the teachers are highly qualified, with the core teachers showing particularly strong dedication to the programme. However, not all teachers are equally inspiring. The panel suggests leveraging the active participation of core team teachers and designating them as ambassadors for BES. These ambassadors can inspire educators who may be less directly affiliated with the programme, motivating them to provide engaging and interactive education.

Standard 3. Student assessment

The panel established that the programme benefits from clear university-wide assessment policies, based on the principle of constructive alignment. The assessment methods are adequately diverse and aligned with the final qualifications they are intended to evaluate. Sufficient attention is paid to the validity, reliability and transparency of tests and examinations.

The Examining Board (EB) plays a crucial role in approving individual student study programmes and ensuring the quality of course assessments within the programme. The regular meetings with both chair groups and Programme Committees further enhance its oversight of assessment quality at the programme level. While the panel is confident in the effectiveness of the EB, it recommends closely monitoring the EB's workload and implementing necessary measures if needed.

The assessment forms and grading templates for the bachelor's thesis provide clear assessment criteria but not always include adequate written feedback and transparent grade justification. While the panel acknowledges the value of the substantial oral feedback students receive on their final thesis, it emphasises the importance of ensuring that all students receive substantial written feedback. The panel views the mandatory inclusion of written feedback in Osiris as a positive step and recommends engaging all chair groups in further enhancing the integration of feedback into the digitized assessment process.

Standard 4. Achieved learning outcomes

The panel appreciates the quality and relevance of the thesis projects, demonstrating the achievement of the intended learning outcomes. The majority of graduates opt for a master's programme that aligns well with their bachelor's degree.

Score table

The panel assesses the programme as follows:

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
Date: 13 June 2024

Drs. E. (Esther) Poort, panel secretary

Introduction

Procedure

Assessment

On 18 and 19 March 2024, the bachelor's programme Environmental Sciences of Wageningen 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, Radboud University, Vrije Universiteit Amsterdam, University of Groningen, Maastricht University, Leiden University, Utrecht University and the Amsterdam Institute for Advanced Metropolitan Solutions (of Delft University of Technology and Wageningen 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 Hilderling and Jessica van Rossum acted as coordinator and panel secretaries. Annemarie Venemans, Esther Poort, Anne-Lise Kamphuis, Linda te Marvelde and Carlijn Braam also acted as secretaries in the cluster assessment. They have been certified and registered by the NVAO. Esther Poort acted as panel secretary in the assessment of the programmes of Wageningen 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 on 19 December 2023 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 secretary with a list of graduates over the period 2021-2023. In consultation with the secretary, the panel chair selected 15 theses per programme. They took the diversity of final grades and examiners into account, as well as the various specializations. 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 director 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 programme director and Wageningen 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, senior 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 University;
- 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 Living Environment and Nature 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., alumnus (March 2023) of the master's programme Environmental Sciences (Policy Track) of Wageningen University (student member);
- F.O. (Fenna) Oostrum, alumnus (September 2023) of the master's programme Environment and Society Studies of Radboud University (student member).

The panel assessing the bachelor's programme Environmental Sciences at Wageningen 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);

- Dr. S.E. (Sarah) Cornell, associate professor at the Stockholm Resilience Centre of Stockholm University (Sweden);
- Dr. A.R. (Ana) Vasques, senior lecturer at the Erasmus University College of Erasmus University Rotterdam;
- Prof. dr. ir. S.E. (Siegfried) Vlaeminck, professor in Microbial Cleantech and Environmental Systems Analyses at the Universiteit of Antwerpen (Belgium);
- F.O. (Fenna) Oostrum, alumnus (September 2023) of the master's programme Environment and Society Studies of Radboud University (student member).

Information on the programme

Name of the institution:	Wageningen University
Status of the institution:	Publicly funded institution
Result institutional quality assurance assessment:	Positive
Programme name:	Environmental Sciences
CROHO number:	56283
Level:	Bachelor
Orientation:	Academic
Number of credits:	180 EC
Specializations:	Environmental Policy and Economics Environmental Quality and Systems Analysis Environmental Technology
Location:	Wageningen
Mode(s) of study:	Fulltime
Language of instruction:	English
Submission date NVAO:	1 November 2024

Description of the assessment

Organization

Wageningen University & Research (WUR) is made up of Wageningen University (WU) and 9 research institutes of the Stichting Wageningen Research (WR). Wageningen University (WU) consists of one faculty of Agricultural and Environmental Sciences. Within WUR there are five science groups: Agrotechnology & Food Sciences, Animal Sciences, Environmental Sciences, Plant Sciences and Social Sciences. Within these science groups, one or more university departments and research institutes within the same research field are combined. Each university department contains between eleven and twenty chair groups, each managed by a professor, the so-called chair holder. The chair holder manages the members of the chair groups and distributes research and education activities among them in collaboration with other chair holders of other chair groups. Wageningen University has 20 bachelor's and 31 master's programmes.

The Rector Magnificus of WU is also the Dean of the Faculty and a member of the Executive Board of WUR. The rector appoints the Board of Education, which consists of four professors and four students. The Board of Education is the legal governing body of all degree programmes; it is responsible for their design, content, quality, and financing. The bachelor's programme Environmental Sciences (BES) collaborates with the Master's of Environmental Sciences (MES) and the Master's of Urban Environmental Management (MUE) in a joint Programme Committee overseen by one Programme Director. This Programme Director implements the Board of Education's directions and is in close contact with the Chair Groups regarding the design, content and quality of the courses provided. The Programme Committee advises the Board of Education on the content and quality of the degree programmes. These three programmes have their own Curriculum Committee.

Recommendations previous accreditation panel

The self-evaluation report outlined the measures undertaken to address the recommendations provided by the previous accreditation panel in 2018. Also, several recommendations and their follow-up actions were discussed with the programme during the site visit. The panel concludes that the programme management demonstrates an impressive commitment to continuous improvement across all levels, effectively addressing previous external review recommendations. Overall, the panel expresses satisfaction with the implemented improvement strategies, acknowledging their significant contribution to elevating the quality of the programme. However, the panel underlines the ongoing importance of one of the previous panel's recommendations: offering more detailed written feedback on the theses. While acknowledging the progress already achieved, the panel believes there's still some room for enhancement in this area. This aspect is further explored under standard 3.

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

Programme's profile

The BSc Environmental Sciences programme (BES) is an international three-year programme that focuses on environmental and sustainability challenges like climate change, the depletion of natural resources, environmental pollution, the loss of biodiversity and water scarcity. Throughout the programme, students

learn to cope with complex environmental issues marked by uncertainties, knowledge gaps, and conflicting perspectives. By focusing on planetary boundaries, the programme aims to empower students to play an active role in advancing towards a sustainable society.

The programme provides students with essential knowledge and understanding of the principles, methods, terminology and integration and application of natural and social sciences. Students are trained to incorporate different perspectives and experiences that result from diversity in cultural and educational backgrounds, as this is considered crucial for understanding and addressing the global environmental challenges.

The programme adopts a systems thinking approach to enable students to explore environmental challenges and solutions from interdisciplinary and transdisciplinary perspectives. Throughout the programme, students receive training in interdisciplinary problem-oriented research and develop academic skills within environmental and transdisciplinary contexts. Students learn essential research methodologies and cultivate critical reflection abilities to address environmental challenges and theories effectively.

The programme offers three specializations. Within their specialization, students explore social sciences in the Environmental Policy and Economics track, delve into natural sciences in the Environmental Quality and Systems Analysis track, or applied natural sciences in the Environmental Technology track.

The panel highly values the programme's interdisciplinary approach to environmental sciences, coupled with the opportunity for students to specialize in three specific areas tailored to their interests and abilities. This setup not only allows students to build a solid foundation in environmental natural sciences and environmental social sciences but also enables them to delve deeper into a chosen area of expertise. Moreover, the panel appreciates the programme's strong research orientation, particularly its focus on interdisciplinary problem-solving and solution-oriented approaches. With such a distinctive profile and structure, the BES programme holds a unique position within the landscape of environmental sciences education in the Netherlands.

Intended learning outcomes

The programme has translated its aims into a set of eighteen intended learning outcomes (ILOs). An overview of the ILOs can be found in appendix 1. The programme has linked these ILOs to both the Dublin descriptors and the Domain-Specific Reference Framework for academic programmes in Environment and Sustainability in the Netherlands.

The panel has reviewed the ILOs and determined that they accurately represent the bachelor's level and academic orientation and align well with the Dutch Reference Framework. According to the panel, the programme's ILOs are clearly defined and concrete. They reflect the interdisciplinary focus of the programme and effectively connect theoretical knowledge with practical skills. Additionally, the ILOs reflect the programme's emphasis on systems thinking and problem-solving, demonstrating the programme's commitment to preparing students to effectively navigate rapidly evolving environmental challenges.

The programme is currently undergoing a comprehensive update and enhancement through the 'Rethinking BES project'. As part of this initiative, the programme is revising the ILOs to ensure they are clearer, more challenging, and engaging, with a heightened focus on academic skills. These updated ILOs will be implemented starting from the academic year 2024-2025. The programme has identified several key skills essential to BES, including systems thinking, collaboration, diversity & inclusivity, social embeddedness, and problem-solving. While these skills are already integrated into the curriculum, the programme aims to

articulate them more explicitly within the new ILOs. The panel reviewed these updated ILOs and is pleased with the revisions made. It strongly supports this intensified focus on these key competencies, as it believes that these 'resilient skills' are crucial for students to effectively address environmental challenges.

Professional field

The panel found the connection to the professional field to be commendable. The External Advisory Committee (EAC) plays a vital role, actively engaging not only in discussions about the Intended Learning Outcomes (ILOs) and curriculum but also contributing to the programme's development. As outlined in the self-evaluation report, the EAC confirmed that the learning outcomes of BES are aligned with the demands of the labour market, with graduates highly valued for multidisciplinary education, broad orientation, systems thinking approach, sustainable solutions thinking, and strong academic skills.

Considerations

The panel highly appreciates the programme's profile, which focuses on equipping students with a comprehensive understanding of environmental challenges. Its interdisciplinary approach and specialized tracks allow students to tailor their education while developing a solid foundation in both natural and social sciences. The programme's strong research orientation and emphasis on systems thinking and problem-solving, prepare students to effectively navigate rapidly evolving environmental challenges.

The interdisciplinary profile of the programme is reflected in eighteen intended learning outcomes (ILOs) which align with the Dublin descriptors for bachelor's programmes and the expectations in the professional field.

Conclusion

The panel concludes that the bachelor's programme Environmental Sciences 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 curriculum comprises three primary components: the common part (108 EC), specializations (42 EC), and free space (30 EC). A schematic overview of the curriculum is available in appendix 2.

The programme's common part encompasses three categories of courses: a) foundation courses, b) domain-related courses, and c) integration courses. Foundation courses offer a solid grounding in mathematics, statistics, chemistry, physics, and biology. Domain-related courses span topics such as 'Introduction to Environmental Sciences', along with courses on Soil, Water, and Air Quality, 'Introduction to Environmental Systems Analysis' and 'Introduction to Environmental Technology'. The integration courses focus on analysing environmental problems and designing solutions by integrating knowledge from various disciplines. These courses specifically emphasize the development of academic skills such as collaboration, diversity and inclusivity, social integration, systems thinking, and problem-solving.

In the second part of their second year and throughout one semester in their third year, students have the opportunity to choose one of three specializations. 'Environmental Policy and Economics' delves into understanding the societal roots of environmental and sustainability challenges, governance structures, and economic strategies for prevention and management. 'Environmental Quality and Systems Analysis' adopts

a systems-oriented framework to examine processes within and between environmental domains such as soil, water, and air, and their impacts on ecosystems and society. 'Environmental Technology' concentrates on designing and developing biological, physical, and chemical processes and technologies to improve environmental quality, mitigate emissions, and recover valuable resources.

Each specialization culminates in a bachelor's thesis (12 EC total), where students align their research topics with their specific interests. The thesis encompasses the entire research process, including proposal writing, developing a theoretical framework based on literature, formulating hypotheses/research questions, designing methodology, applying acquired knowledge, discussing results, and drawing solid conclusions. It culminates in a written report, a public colloquium with audience questions, and a final discussion involving the student, supervisor(s), and examiner.

In the third year, students can choose 30 EC elective courses. This can be a mix of free elective courses, or a predefined minor offered by WU, another Dutch university, or a university abroad. A significant portion of students choose to do this part of their studies abroad. The majority of the staff is involved in international research projects and often has a great international network available for students to select (international) internship hosts.

After reviewing the documents and engaging in discussions during the site visit, the panel concludes that the ILOs found a consistent and balanced translation into a rich, varied, and flexible curriculum. The self-evaluation report provides a clear explanation of how ILOs are accomplished in the programme and how the learning outcomes of individual courses contribute to the overall learning outcomes of the programme. The curriculum effectively furnishes students with a robust foundation, particularly in the natural sciences, and offers a comprehensive array of environmental sciences content. The common part of the programme encompasses a thorough set of courses that not only cultivate detailed analytical skills but also provide a broad contextual understanding. Throughout all the different components of the curriculum, from the foundational courses to the thesis projects, students successfully engage with highly cross-disciplinary content. Additionally, the panel highly values the flexibility afforded to students to specialize in a specific area and offers ample opportunities for them to pursue their individual academic and career aspirations.

The panel learnt that the programme management is currently working on further improving the curriculum through the Rethinking BES project. This initiative involves updating the common part of the programme and critically considering what should be offered to all students, such as incorporating greater emphasis on data sciences. Other key improvements entail aligning foundation, domain, and integration courses, along with a better distribution of these courses. These improvements aim to not only enhance student motivation for foundation courses but also ensure the practical application of foundational knowledge in domain-specific topics and challenges. The panel fully supports these plans and perceives these initiatives as a clear demonstration of the management's commitment to ongoing programme improvement.

When developing the new curriculum, the panel recommends considering the placement of the specializations and the thesis within the third year. Currently, students enrolled in the Environmental Quality and Systems Analysis specialization write their thesis during the second half of the third year, while students in the other two specializations do so during the first half of the third year. The panel believes that students would benefit more from concluding their bachelor's programme with a thesis as it enables them to apply the knowledge and skills acquired in their electives to their thesis work. Therefore, the panel advises standardizing this approach for all three specializations and scheduling them for the final part of the third year.

Name and language of instruction

The programme has been offered in English as an international programme since 2018. The programme is therefore taught in English and has an English name. The programme management supports this decision by emphasizing the global nature of environmental sciences and the need to prepare students for a career in an international job market. Furthermore, the programme believes that an international classroom enriches the students' perspective.

The panel acknowledges the rationale behind the decision to use English and is pleased to see the diverse student population. The percentage of international students has grown from 30% in 2018 to 48% in 2023. The panel fully acknowledges the significance of an international classroom, as it prepares students to navigate diversity in nationalities, cultures, and perspectives. This equips them with the essential skills and viewpoints needed to tackle complex environmental challenges.

In the eyes of the panel, sufficient attention is paid to the language proficiency of the teaching staff. All lecturers are asked to test and, if necessary, improve their level of English language proficiency. Additionally, during the recruitment and selection process for new lecturers, careful consideration is given to their language proficiency.

Teaching approach

The programme utilizes various teaching methods, including lectures (which may incorporate knowledge clips), tutorials, hands-on practical training (such as laboratory work or computer-based exercises), field excursions (including single or multi-day trips), group projects, individual paper assignments, and independent study. It combines large-scale lectures to disseminate foundational knowledge with smaller tutorials and group discussions. These smaller sessions are designed to facilitate exercises and discussions related to course content, while practical sessions provide students with hands-on experience in laboratory settings and with relevant software applications.

Several courses within the programme integrate real-life scenarios, allowing students to apply scientific and practical knowledge to address complex, interdisciplinary issues. Additionally, many courses, including the integration courses, incorporate elements of rich learning environments, such as real-life case studies, field excursions, and engagements with societal stakeholders.

Based on the documents and the conversations with the students and teaching staff, the panel concludes that the programme effectively utilizes well-suited teaching methods, enabling personalized learning through a balanced approach that integrates large-scale lectures and small-group tutorials. Through the varied teaching methods, students are encouraged to actively engage and develop their skills and knowledge to obtain the programme's ILOs. The panel appreciates the valuable opportunities provided by laboratory and field studies, allowing students to interact with 'real clients' in project-based studies.

Study support and guidance

Prior to the start of the academic year, the Programme Team, consisting of study advisers, a secretary, and the programme director, collaborates with the student association 'Aktief Slip' to organize a study day for BES students. This day serves as an orientation to the programme, allowing students to meet their peers, mentors, and members of the Programme Team. Since the launch of the international programme in September 2018, the Programme Team, in cooperation with Aktief Slip, has offered a mentor programme to assist new students in acclimating to their new environment and establishing a peer network. Aktief Slip organizes a variety of activities including general meetings, dinners, parties, field trips, symposia, career days, and an annual Environmental Week.

Throughout their first year, study advisers invite students to individual meetings at least twice. In addition to these meetings and informational sessions, general support is available at the university. During their studies, students have access to their study adviser for consultation. These advisers play a crucial role in planning the students' programmes and assist students encountering personal issues hindering their academic progress by referring them to the Student Service Centre, student deans, psychologists, Student Training and Support, or Career Services.

The panel considers the offered support of good quality. This impression is also confirmed by the students the panel met, who feel equipped and supported to create their own study path. They consider the programme feasible and did not mention any hindrances to the feasibility of their studies. Delays are more likely to be the result of students' individual choices rather than stumbling blocks in the thesis process.

Teaching staff

The courses are taught by a diverse group of teachers including full professors, scientific personnel on tenure tracks, and other academics. This team is supported by technicians, research assistants, and PhD students. Teachers are experts in their field and are involved in research. Almost all teachers involved in BES have obtained a PhD and most have earned a University Teaching Quality (UTQ) or are in the process of getting qualified. Some teachers take part in the recently developed Senior Teaching Qualification training (SUTQ).

The core teaching chair groups within the programme are actively engaged in the oversight of the programme's organization, structure, and quality. They are represented in the Programme Committee either as full members or as agenda participants. Moreover, they play integral roles within the Curriculum Committee for the BES, ensuring close involvement in all aspects of programme management and development.

The panel has engaged with highly qualified and dedicated teachers who are part of the core group of teachers within BES. These individuals are experts in their fields, actively involved in research, yet remain approachable and concerned about 'their' students. The panel was particularly impressed by the strong commitment of this core teaching group to BES and their involvement in the development of BES within the Rethinking BES project.

Students whom the panel met expressed positivity about the teaching staff. They value their active engagement and meaningful interactions during small-scale tutorials. However, in the student chapter, students noted that not all teachers are equally inspiring. According to the students, some teachers are less able than others to translate their research experience and knowledge into engaging course content, such as by incorporating real-life examples and embracing innovative communication and teaching methods. The panel believes that this is partly due to the fact that education is provided by a broad group of teachers from various chair groups who teach courses across multiple programmes. The autonomy granted to chair groups in their scientific development that is reflected in their teaching poses difficulties for programme management in fully overseeing the practices of all teachers and keep them aligned with the priorities of the programme. The panel recommends maximizing the involvement and dedication of the core team teachers and utilizing them as ambassadors for BES to inspire other teachers who are less closely related to the programme to deliver engaging and interactive education.

Considerations

The panel confirmed that the curriculum enables students to attain the intended learning outcomes. Aligned with its objectives, the curriculum provides a broad interdisciplinary programme covering various

environmental sciences topics. The core component of the programme consists of a comprehensive set of courses that not only cultivate detailed analytical skills but also promote a broad contextual understanding. According to the panel, a significant asset of the curriculum is the flexibility it provides for students to specialize in specific areas, along with ample opportunities to pursue their individual academic and career goals. The panel endorses the decision to offer the programme in English as an international programme. The international classroom prepares students to navigate diversity in nationalities, cultures, and perspectives.

The programme effectively employs various teaching methods, facilitating personalized learning through a combination of large-scale lectures and small-group tutorials. The panel highly regards the practical experiences offered by laboratory and field studies, enabling students to engage with real clients in project-based studies. The programme is feasible, and students receive adequate support and guidance to create their study path.

The programme is taught by a diverse group of teachers who are involved in multiple programmes. Generally, the teachers are highly qualified, with the core teachers showing particularly strong dedication to the programme. However, not all teachers are equally inspiring. The panel suggests leveraging the active participation of core team teachers and designating them as ambassadors for BES. These ambassadors can inspire educators who may be less directly affiliated with the programme, motivating them to provide engaging and interactive education.

Conclusion

The panel concludes that the bachelor's programme Environmental Sciences meets standard 2.

Standard 3. Student assessment

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

Findings

To ensure the quality of assessment, WU has developed an institution-wide assessment policy. One key principle of this policy is the alignment of assessment with education, following the concept of constructive alignment.

The programme employs various assessment methods ensuring that each course includes an assessment of students' knowledge, understanding, and skills that are aligned with the course learning outcomes. The assessment methods include written exams, individual or group assignments, (computer)practical reports, papers/essays, presentations, and participation in course work. The assessment matrix, included in the self-evaluation report, offers a comprehensive overview of the assessment methods employed in each course of the program, while also indicating which specific ILOs are being assessed.

All courses have a course guide that includes a transparent assessment strategy. These guides are available for students at the start of their course. The Examining Board (EB) checks and approves the description of these assessment strategies. To enhance exam transparency, the EB ensures that the relative contribution and minimum grades for partial exams are explicitly specified, and the type of exam is specified in the study handbook. For written exams, courses typically provide example exams to students and/or discuss previous exam questions in class. In the case of papers, students are informed in advance about the assessment criteria, often through a rubric or grading form.

The students the panel met confirmed that the courses employ a diverse range of assessment methods, including formative assessments. They value group work as it offers them opportunities to collaborate with peers, gain insights from different perspectives, and foster their teamwork and communication skills. Additionally, they were satisfied with the programme's efforts to prevent freeriding, such as incorporating peer assessments at the end of the project.

The panel concludes that the assessment methods are adequately diverse and aligned with the final qualifications they are intended to evaluate. The assessment matrix ensures that course assessments encompass all knowledge and skills outlined in the programme's ILOs. The combination of group work and individual work prepares students for their work in a future professional setting.

The panel is satisfied with the programme's response to the previous panel's recommendation to test academic skills and self-directed learning competencies more clearly and to consider incorporating formative assessments for these aspects. As outlined in the self-evaluation report, this recommendation has been addressed through the Wageningen University BSc Skills Project, initiated in 2019. This initiative involves identifying and describing essential skills, as well as developing rubrics, teaching methods, and assessment strategies. Recently, in December 2023, the proposal for a programmatic assessment of skills was approved by the Board of Education. This project aims to enhance and implement formative skills assessment specifically within the BSc Environmental Sciences programme and to contribute to the overall Wageningen University Assessment Strategy for 2023.

Examination Board

BES falls under the Examining Board Environment and Landscape (EBEL), one of the four Examining Boards (EB) of WU. The EB formally appoints examiners who are nominated by chair holders. The EB also safeguards the transparency, validity and reliability of examinations or intermediate examinations in all programmes. It monitors compliance with the assessment policy and can give instructions to the examiners – in line with the assessment policy – relating to the examination.

The individual study programme of each student is submitted to the EBEL for approval through the student information system Osiris. The approved programme must align with the intended learning outcomes of the overall programme. The EBEL assesses the level and content of courses in the electives. Any individual deviations from the described study programme (such as exemptions or substitutions) require approval from the Examining Board. The graduation process is initiated by Osiris when a student completes all compulsory and restricted optional courses and earns the required number of credits, including electives approved by the EBEL.

EBEL conducts regular and follow-up visits to each of the chair groups contributing to the BES programme every three to five years. During a regular visit, EBEL reviews the assessment procedures of the group, focusing particularly on the validity, reliability, and transparency of the interim examinations. An important task of EB is reviewing theses, regarding the quality of the assessment as well as on the fit with the programme's learning outcomes. EBEL combined thesis reviews with chair group visits. Since the academic year 2021-2022, the EB has increased its interaction with programme committees and programme directors by attending one Programme Committee meeting per year. Evaluation of the programme's assessment strategies and alignment of learning outcomes at both course and programme levels are on the agenda of these meetings.

Based on the documentation and the interview during the site visit, the panel concludes that the EB functions effectively. The panel appreciates that the EB not only visits chair groups but also Programme

Committees, which enhances their role in ensuring the quality of assessments at the programme level. However, the panel observed that this additional responsibility adds to the already high workload of the EB, particularly in approving each student's study programme. Therefore, the panel recommends closely monitoring the workload of the EB and taking necessary measures if needed.

Assessment of the bachelor's thesis

The BSc thesis is linked to the specialization of the student, with each specialization having its own unique thesis course code. Given the large student body and diverse science domains, staff members from various groups are involved in supervision. In recent years, efforts have been made to harmonize the BSc thesis across specializations, resulting in a standardized structure: a 3 EC component concentrating on proposal writing and methodology, followed by a 9 EC segment dedicated to conducting the proposed research.

The first part is graded according to the assessment strategy, which, due to the nature of the specializations, varies slightly among the three specializations. For the second part of the thesis, a detailed assessment strategy is employed, outlined in rubrics and aligned with the learning outcomes. The overall quality of Part 2 is evaluated based on four criteria groups (and their respective weight): research competencies (40%), thesis report (40-50%), colloquium (5-15%), and final discussion (5%). The thesis is always assessed following the "4 eyes" principle, meaning two assessors evaluate and grade the student's work.

The previous assessment panel considered the assessment processes to be up to standard, involving two examiners and being conducted using elaborate scoring forms. However, the previous panel advised to add more extensive written comments to the assessment forms to substantiate the grades. The current panel also found that the assessment forms and grading templates are transparent in their design, incorporating clear assessment criteria that ensure that consistent information is gathered and provided to the student. However, many of the assessment forms still demonstrated rather limited constructive written feedback or a qualitative grade justification. Through interviews with students and teachers, the panel learned that feedback and grade justification are usually given to students in the form of oral feedback in addition to these forms. Although the panel appreciates the extensive effort put into providing students with substantial feedback, it recommends further enhancing the integration of written feedback into the digitized assessment process. This will not only improve assessment transparency for external stakeholders such as the EB but also enhance students' learning trajectories. Given that most bachelor students will pursue a master's programme, having access to specific written feedback detailing the strengths and weaknesses of their bachelor's thesis is beneficial when they begin writing their master's thesis. The programme might even consider exploring the possibility of recording the oral feedback (perhaps automatically transferred into written text) and providing it this way to students to prevent introducing an extra administrative task.

The panel discussed the absence of written feedback in some of the thesis assessment forms with the EB. The EB members noted that this issue has garnered significant attention since the previous visitation. Within the new student system Osiris, teachers must offer narrative feedback. They acknowledged that although there has been progress since six years ago, there is still room for improvement. They mentioned that they consistently bring up this issue during their visits to the chair groups. Additionally, they pointed out the cultural differences among chair groups regarding this issue, highlighting that some chair groups are more hesitant to document specific feedback in writing due to concerns about increased workload. The panel advises EB to continue prioritizing this matter in the upcoming period, especially emphasizing the importance of written feedback to chair groups that are less inclined to acknowledge it.

Considerations

The panel established that the programme benefits from clear university-wide assessment policies, based on the principle of constructive alignment. The assessment methods are adequately diverse and aligned with the final qualifications they are intended to evaluate. Sufficient attention is paid to the validity, reliability and transparency of tests and examinations.

The Examining Board (EB) plays a crucial role in approving individual student study programmes and ensuring the quality of course assessments within the programme. The regular meetings with both chair groups and Programme Committees further enhance its oversight of assessment quality at the programme level. While the panel is confident in the effectiveness of the EB, it recommends closely monitoring the EB's workload and implementing necessary measures if needed.

The assessment forms and grading templates for the bachelor's thesis provide clear assessment criteria but not always include adequate written feedback and transparent grade justification. While the panel acknowledges the value of the substantial oral feedback students receive on their final thesis, it emphasises the importance of ensuring that all students receive substantial written feedback. The panel views the mandatory inclusion of written feedback in Osiris as a positive step and recommends engaging all chair groups in further enhancing the integration of feedback into the digitized assessment process.

Conclusion

The panel concludes that the bachelor's programme Environmental Sciences meets standard 3.

Standard 4. Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings

The panel looked at a selection of 15 final theses of the programme representing its three specialisations. It concluded that all of these exemplify the expected level and quality of a bachelor's thesis in environmental sciences. The theses demonstrate students' ability to navigate the complete research cycle within their specialization topics. The panel was pleased to see that the theses cover a wide range of topics, demonstrating the full breadth of the programme.

Graduates of the BES programme have guaranteed admission to various Wageningen University Master's programmes, such as Environmental Sciences, Urban Environmental Management, Climate Studies, Biobased Sciences, Aquaculture and Marine Resource Management, and Development and Rural Innovation. The panel noted that the majority of students opt to pursue their master's degree in one of these programmes. Additionally, they actively seek and gain access to a wide range of other master's programmes at Wageningen University and other universities, especially in the fields of environmental and sustainability sciences.

Considerations

The panel appreciates the quality and relevance of the thesis projects, demonstrating the achievement of the intended learning outcomes. The majority of graduates opt for a master's programme that aligns well with their bachelor's degree.

Conclusion

The panel concludes that the bachelor's programme Environmental Sciences meets standard 4.

General conclusion

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

Development points

1. Consider positioning the thesis at the end of the third year for all three specializations.
2. Leverage the active participation of core team teachers and designate them as ambassadors for BES to inspire teachers less directly connected to the programme.
3. Strengthen the incorporation of written feedback on the thesis into the digitized assessment process to enhance transparency and learning.

Appendix 1. Intended learning outcomes

	After successful completion of the programme graduates are expected to be able to:	Dublin descriptors*
1	define Earth systems and the physical, chemical and biological processes that are involved in environmental pollution and degradation;	1
2	apply systems analysis methods and tools to analyse and understand human interactions with the environment;	1, 2
3	show how natural physical, chemical and biological processes can be utilized to mitigate or minimize the effects of human activities on the environment;	1, 2
4	explain the sociological, administrative, legal and economic aspects of the interactions between people and their physical environment;	1
5	position the environmental sciences in relation to other fields of science, and justify the reasons for their existence;	1
6	characterise the fields of activity of professional environmental scientists;	1
7	approach environmental and sustainability issues in an interdisciplinary way and deal with complexity and changes over scales of time and space;	2
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;	2, 3, 5
9	analyse the societal context of an environmental problem or sustainability issue including stakeholders' perspectives;	2, 3
10	communicate their findings in a clear and concise manner, both in writing and orally, to an international scientific audience;	4
11	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;	3, 4
12	translate scientific knowledge into policy or technological recommendations with a view to solving environmental and sustainability issues;	2, 3, 5
13	function effectively in multidisciplinary and intercultural teams and value the contributions of various perspectives in designing solutions for complex (environmental) problems / sustainability issues;	4, 5
14	collaborate in a team dealing with research, policy development or management of environmental issues even in a tight time frame and an international setting;	4, 5
15	reflect upon personal competence, develop an appreciation and skill for peer review and peer feedback and design and plan their own learning path.	5
	After successful completion of the programme graduates of the specialisation Environmental Quality and Systems Analysis are expected to be able to:	
16a	analyse and evaluate policy developments (including economic, social and legal aspects) regarding environmental and sustainability issues;	2
17a	summarise academic literature and formulate theoretically informed opinions on latest policy developments;	2
18a	integrate knowledge and analysis in a document that presents optimal policy approaches in a clear and concise manner.	2, 4
	After successful completion of the programme graduates of the specialisation Environmental Policy and Economics are expected to be able to:	
16b	systematically assess environmental and sustainability issues and summarise academic literature on these issues;	2
17b	integrate the information gained in a document presenting causes and effects of environmental and sustainability issues;	2
18b	identify and evaluate optional responses in a clear and concise manner.	2, 4
	After successful completion of the programme graduates of the specialisation Environmental Technology are expected to be able to:	
16c	evaluate the usefulness of academic findings from basic scientific fields - like microbiology, chemistry and physics - for technology development;	2
17c	design technological solutions for environmental and sustainability issues;	2
18c	test these solutions to technological, economic, and social preconditions.	2, 4

Appendix 2. Programme curriculum

Year 1

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6
YUW-10803 Introduction Environmental Sciences	BIP-10306 Introductory Physics	MAT-14903 Mathematics 2	MAT-15003 Mathematics 3	ENP-10806 Environmental Policy Instruments	PEN-10503 Ecology 1
ENP-11303 Sust. Solutions to Env. Problems	HWM-10303 Water 1	PCC-12403 General Chemistry 2	MAT-15403 Statistics 2	MIB-11806 Microbiology & Toxicology	ESA-10309 Environmental Sciences and Society
MAT-14803 Mathematics 1 OR* MAT-15303 Statistics 1	PCC-12303 General Chemistry 1 SGL-12803 Introduction to Soil Geography				

* students with vwo Mathematics A, choose Math1; with vwo Mathematics B, choose Stat1

Spec. A Environmental Policy and Economics

Year 2

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6
MAQ-11306 Air Quality	ENP-23806 Sustainability Transitions: Concepts, Issues and Indicators	LAW-22306 International and EU Environmental Law	AEW-23803 Water 2	ENP-24803 Social Scientific Analysis of Environmental Issues	ESA-22303 International Study Visits Environmental Sciences
ETE-10806 Introduction Environmental Technology	ESA-20506 Introduction to Environmental Systems Analysis		SOC-22803 Principles of Soil Processes	ENR-21306 Environmental Economics for Environmental Sciences	ETE-25812 Environmental Project Studies

Year 3

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6
ENP-20806 Environmental Management and Industry	ENP-81603 BSc Thesis Environmental Policy and Economics Part1	ENP-81606 BSc Thesis Environmental Policy and Economics Part 2	Free choice or Minor	Free choice or Minor	Free choice or Minor
GEO-20406 Human Geography: Theory and Practice	CPT-22306 Communicating for Sustainability and Responsible Innovation				

foundation course
 domain course
 integration course
 specialization course
 free choice course

Spec. B Environmental Quality and Systems Analysis

Year 2

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	
MAQ-11306 Air Quality	ENP-23806 Sustainability Transitions: Concepts, Issues and Indicators	GRS-10306 Introduction Geo-information Science	AEW-23803 Water 2	ENP-24803 Social Scientific Analysis of Environmental Issues	ETE-25812 Environmental Project Studies	ETE-25812 Environmental Project Studies
ETE-10806 Introduction Environmental Technology	ESA-20506 Introduction to Environmental Systems Analysis		SOC-22803 Principles of Soil Processes	SOC-21306 Soil Pollution and Soil Protection	ESA-22303 International Study Visits Environmental Sciences	

Year 3

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	
Free choice or Minor	Free choice or Minor	Free choice or Minor	AEW-31306 Water Quality	TOX-20303 General Toxicology & WSG-36306 Assessment Marine Nature Based Solutions	WSG -36306 Follow up Period 5 Morning	ESA-81309 BSc Thesis Environmental Quality and Systems Analysis Part 2
Free choice or Minor	Free choice or Minor			ESA-81303 BSc Thesis Environmental Quality and Systems Analysis Part 1	PEN-21803 Ecology of C, E & L: Theory	

Spec. C Environmental Technology

Year 2

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	
MAQ-11306 Air Quality	ENP-23806 Sustainability Transitions: Concepts, Issues and Indicators	ORC- 12803 Organic Chemistry 1	AEW-23803 Water 2	ENP-24803 Social Scientific Analysis of Environmental Issues	ETE-25812 Environmental Project Studies	ETE-25812 Environmental Project Studies
ETE-10806 Introduction Environmental Technology	ESA-20506 Introduction to Environmental Systems Analysis	ORC- 13303 Environ- mental Chemistry	SOC-22803 Principles of Soil Processes	ETE-26806 Environmental Process Engineering	ESA-22303 International Study Visits Environmental Sciences	

Year 3

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6
ETE-21306 Water Treatment	PCC-21802 Introductory Thermo-dynamics A		Free choice or Minor	Free choice or Minor	Free choice or Minor
MAT-23306 Multivariate Mathematics Applied	ETE-80903 BSc Thesis Environmental Technology Part 1: Design Tools	ETE-26304 Renewable Energy Technologies		Free choice or Minor	
	ETE-80909 BSc Thesis Environmental Technology Part 2			Free choice or Minor	

Programme consists of:

1. Common Part (108 EC):
 - Foundation courses
 - Domain-Related Courses
 - Integration Courses
2. Specializations (42 EC):
 - Environmental Policy and Economics
 - Environmental Quality and Systems Analysis
 - Environmental Technology

Each specialization is concluded by a BSc thesis (in total 12 EC).
3. Free Space (30 EC): optional courses, which can be a mix of free-choice courses or a predefined minor offered by Wageningen University, another Dutch university, or a university abroad.

Appendix 3. Programme of the site visit

BES Bachelor Environmental Sciences

MES Master Environmental Sciences

MUE Master Urban Environmental Management

Monday 18 March 2024

8.45-9.15	Arrival and preparation panel
9.15-10.30	Management BES/MES/MUE
10.45-11.30	BES students (specialisation, start year)
11.45-12.30	BES core lectures
12.30-13.30	Lunch
13.30-14.15	MES students
14.15-15.00	MES core Lecturers
15:00-15.30	Break
15.30-16.15	MUE students
16.30-17.15	MUE core lecturers
17.15-17.30	Wrap up panel

Tuesday 19 March 2024

8.45-9.15	Preparation panel
09.15-09.45	Alumni MES and MUE
10.00-10.30	Examining Board and Study Advisers
10.30-11.30	Internal deliberations panel
11.30-12.00	Final meeting management
12.00-12.45	Development meeting
12.45-14.45	Drafting Findings panel (including lunch)
14.45-15.30	Oral feedback/report of findings and closure

Appendix 4. Materials

Prior to the site visit, the panel studied 15 theses of the bachelor's programme Environmental Sciences. Information on the theses is available from Academion upon request.

The panel also studied other materials, which included:

- Report previous accreditation
- Learning outcomes
- Schematic. overview of the programme
- Assessment Matrix
- Assessment policy Wageningen University
- Overview teaching staff
- Over MSc after graduation
- Dutch referential framework for academic programmes in Environment and Sustainability
- Selection of course material (five courses)
- Annual reports examining board (2019-2020; 2002-2021; 2022-2023)
- Annual programme committee (2019-2020; 2002-2021; 2022-2023)