

LIFE SCIENCES AND NATURAL RESOURCES
AQUACULTURE AND MARINE RESOURCE MANAGEMENT
WAGENINGEN UNIVERSITY

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This report was finalised on 18 February 2019.



REPORT ON THE MASTER'S PROGRAMME AQUACULTURE AND MARINE RESOURCE MANAGEMENT OF WAGENINGEN UNIVERSITY

This report takes the NVAO's Assessment Framework for Limited Programme Assessments as a starting point (September 2016).

ADMINISTRATIVE DATA REGARDING THE PROGRAMME

Master's programme Aquaculture and Marine Resource Management

Name of the programme:	Aquaculture and Marine Resource Management
CROHO number:	60804
Level of the programme:	master
Orientation of the programme:	academic
Number of credits:	120 EC
Specializations or tracks:	Aquaculture Marine Resources and Ecology Marine Governance
Location(s):	Wageningen
Mode(s) of study:	full time
Language of instruction:	English
Expiration of accreditation:	29/09/2022

The visit of the assessment panel Aquaculture and Marine Resource Management to Wageningen University and Research took place on 23-24 October 2018.

ADMINISTRATIVE DATA REGARDING THE INSTITUTION

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

COMPOSITION OF THE ASSESSMENT PANEL

The NVAO approved the composition of the panel on 5 March 2018. The panel that assessed the master's programme Aquaculture and Marine Resource Management consisted of:

- Prof. dr. S. (Stanley) Brul (chair), Professor of Molecular Biology and Microbial Food Safety at the University of Amsterdam and Chair of the Dutch institute for Biology (NIBI), the Netherlands;
- Dr. M.A.H.E. (Mieke) Latijnhouwers, assessment advisor at Radboud University Medical Centre Nijmegen, the Netherlands;
- Prof. dr. P. (Patrick) Sorgeloos, Emeritus Professor of Aquaculture at Ghent University, Belgium;
- Prof. dr. P.G.L. (Peter) Klinkhamer, Professor of Evolutionary Ecology of Plants and Head of the research cluster Plant Sciences and Natural Products at the Institute of Biology of Leiden University, the Netherlands;
- Prof. dr. D. (Daniela) Kleinschmit, Professor of Forest and Environmental Policy at the University of Freiburg, Germany;
- B. (Boas) van het Putten MSc (student member), graduate of Biomedical Sciences at the University of Amsterdam (2017) and currently PhD student at AIGHD/AMC, the Netherlands.

The panel was supported by dr. F. (Floor) Meijer, who acted as secretary.



WORKING METHOD OF THE ASSESSMENT PANEL

Preparation

In preparation of the site visit, the panel studied several documents, amongst others: the NVAO assessment framework (2016), the institutional audit of WUR and the previous programme assessment (of 2016). The accreditation system has entered its third phase (concurrent with a second round of institutional audits). Wageningen University and Research has recently successfully passed its second institutional audit. The new NVAO assessment framework is 'geared to a quality assurance system that is based on trust in the existing, high quality of Dutch higher education'.

The most recent assessment of the programme took place in 2016. In this assessment, standard 1, 3 and 4 were assessed as satisfactory, while standard 2 was assessed as good, leading to the overall assessment satisfactory. The previous panel was pleased with the broad 'beta-gamma' profile of the programme, but concluded that this multidisciplinary approach could be better reflected in the intended learning outcomes. The dynamic nature of the curriculum, and the fact that it could be tailored to the needs and interests of individual students, were considered major strengths, as was the quality of the staff. The panel assessed the assessment strategies and examination methods as appropriate, but concluded that the consistency of assessment across participating chair groups could be strengthened. The quality of theses was deemed sufficient.

With the new philosophy of the framework and the last assessment of these specific programmes in mind, the panel does not wish to elaborate too long on the different criteria of the four standards of the limited framework. The overall evaluation of the programmes by this panel is, as it was in 2016, positive. In this report, therefore, the panel will concentrate specifically on developments since 2016 and on providing suggestions that might help to make the programme even better than it already is.

QANU received the self-assessment report of the master's programme Aquaculture and Marine Resource Management on 4 September 2018 and made it available to the panel. The panel members read the self-assessment report and prepared questions, comments and remarks prior to the site visit. The secretary collected these questions in a document and arranged them according to panel conversation and subject.

In addition, panel members read recent theses from each programme. In consultation with the chair, fifteen theses per programme were selected from the academic years 2015-2016 and 2016-2017, covering the full range of marks given and all three specialisations. The panel members also received the grades and the assessment forms filled out by the examiners and supervisors. An overview of all documents and theses by the panel is included in Appendix 5.

The programme management drafted a programme for the site visit. This was discussed with the secretary and chair of the panel. As requested by QANU, the programme management carefully selected discussion partners. A schedule of the programme for the site visit is included in Appendix 4.

Site visit

The site visit took place on 23 and 24 October 2018 at Wageningen University and Research (WUR). In a preparatory meeting on the first day of the site visit, the panel members discussed their findings based on the self-evaluation and on the theses and formulated the questions and issues to be raised in the interviews with representatives of the programme and other stakeholders.

During the site visit, the panel studied a selection of documents provided by the programme management. They included course descriptions, course materials, written exams, assignments and other assessments.

The panel interviewed the programme management, students, alumni, staff members, members of the Programme Committee and members of the Examining Board.

Report

After the visit, the secretary produced a draft version of the report. She submitted the report to the panel members for comments. The secretary processed corrections, remarks and suggestions for improvement provided by the panel members to produce the revised draft report. This was then sent to WUR to check for factual errors. The comments and suggestions provided by the programme management were discussed with the chair of the assessment panel and, where necessary, with the other panel members. After incorporating the panel's comments, the secretary compiled the final version of the report.

Definition of judgements standards

In accordance with the NVAO's Assessment framework for limited programme assessments, the panel used the following definitions for the assessment of both the standards and the programme as a whole.

Generic quality

The quality that, in an international perspective, may reasonably be expected from a higher education Associate Degree, Bachelor's or Master's programme.

Unsatisfactory

The programme does not meet the generic quality standard and shows shortcomings with respect to multiple aspects of the standard.

Satisfactory

The programme meets the generic quality standard across its entire spectrum.

Good

The programme systematically surpasses the generic quality standard.

Excellent

The programme systematically well surpasses the generic quality standard and is regarded as an international example.



SUMMARY JUDGEMENT

Intended learning outcomes

The master's programme Aquaculture and Marine Resource Management (MAM) aims to teach students an integrative approach to marine ecosystem management, in which biological and ecological knowledge, and technological and socio-economic approaches are equally important. Students choose between three specialisations: (1) Aquaculture, (2) Marine Resources and Ecology and (3) Marine Governance. The panel is pleased with the broad multidisciplinary profile of MAM. The integration of knowledge of aquaculture, marine ecology and marine governance gives the programme a unique position in the domain of Aquaculture and Marine Resource Management. The recently adjusted ILOs match the programme's profile and demonstrate a suitable level and orientation. Also, there is a clear connection with the professional field in the form of the newly reinstated External Advisory Committee (EAC). The panel does advise to include one or more foreign members in the EAC, as the labour market for graduates is highly international.

Teaching-learning environment

The two-year MAM curriculum (120 EC) starts with common courses, followed by specialisation courses (including at least one thesis-preparation course), elective courses, the so-called Academic Master Cluster, an internship (24 EC) and thesis (36 EC). The panel is generally satisfied with the structure and content of the curriculum, which is highly ambitious in its aim to provide students with an integrative perspective on the domain. It established that the curriculum as a whole sufficiently covers all of the intended learning outcomes.

Students of MAM come from a wide variety of disciplinary and national backgrounds. The panel established that the current curriculum setup is geared to dealing with deficiencies, by presenting students with three compulsory courses that introduce the domain, as well as an advanced statistics course. In order to limit overlap and enable students to go in-depth at an early stage, the programme is invited to rethink the setup of the common courses in the first two periods. The panel also recommends to aim for teaching methods that could help fill in knowledge gaps and to keep a close eye on the admission criteria in order to make sure that all students who enter the programme are capable of realising the intended learning outcomes.

In terms of curriculum content, there are opportunities to make more use of existing knowledge of the WUR Chair Groups, many of whom are world leading in fields that are highly relevant to aquatic production systems and marine resource management. Rather than allowing students to pursue important topics such as selective breeding, immunology and nutrition as part of their elective space, it would be preferable to include these in the core curriculum. The panel was pleased to learn that the management is already exploring options to further broaden the curriculum.

A major strength of the programme is its teaching-learning environment, which is characterised by a strong sense of community and close interaction between students and staff. The teaching methods that are used are sufficiently varied and match the intended learning outcomes. Most courses include a useful combination of individual and group work. The panel would advise to ensure that students are sufficiently prepared for and supervised during group work. This also includes setting explicit learning goals for group work. Many of the courses, especially the specialisation courses, are relatively small-scale and interactive. The panel hopes that the current level of small-scale education can be maintained and perhaps even increased by splitting up some of the larger courses that are shared with other programmes. Worth mentioning is the state-of-the-art Carus Aquatic Research Facility (ARF), which is available to students.

The teaching staff of the programme is motivated and qualified. Lecturers are knowledgeable in their respective fields and often have extensive didactic experience. The increasing workload of staff members requires intensive monitoring by the management of the Chair Groups and the central university.

All in all, the panel concludes that the curriculum, teaching-learning environment and staff of the programme enable students to realise the intended learning outcomes. It established that the programme is feasible, even if not all students (choose to) complete it within the appropriate time frame.

Assessment

Assessment in the programme is based on a solid system, which is in line with the WUR-wide assessment policy. Sufficient attention is paid to the validity, reliability and transparency of examinations. The overall level of sample tests studied by the panel is adequate and the combined assessment of all courses covers the full range of intended learning outcomes.

The procedures for assessing the final product of the programmes, the thesis, are sensible and the assessment itself is sound. Exact practices vary somewhat across Chair Groups. To further increase the transparency and comparability of thesis assessment, the panel recommends that all groups use rubrics. It also advises to introduce separate assessment forms for both assessors and to digitise the different steps in the assessment procedure.

Finally, the panel established that the Examining Board safeguards the overall level of assessment in the programmes to the best of its abilities. Increasing the capacity of the EB, as is the intention of the Executive Board, could help to strengthen its agency in relation to the rather autonomous Chair Groups. Nonetheless, the panel feels that the central university should also critically reconsider whether the design of the current quality assurance system optimally suits its purposes.

Achieved learning outcomes

Both the sample theses that were studied by the panel and the position of graduates indicate that students achieve the intended learning outcomes of the programme. The general level of the final projects is satisfactory: the work is of sufficient academic quality and adequately reflects the broad, multidisciplinary profile of the programme. Graduates find employment in a broad range of relevant positions and sectors. Alumni generally feel that the programme has provided them with a solid foundation from which they can benefit in their respective careers.

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

Master's programme Aquaculture and Marine Resource Management

Standard 1: Intended learning outcomes	good
Standard 2: Teaching-learning environment	satisfactory
Standard 3: Student assessment	satisfactory
Standard 4: Achieved learning outcomes	satisfactory
General conclusion	satisfactory

The chair, prof. dr. Stanley Brul, and the secretary, dr. Floor Meijer, of the panel hereby declare that all panel members have studied this report and that they agree with the judgements laid down in the report. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 18 February 2019



DESCRIPTION OF THE STANDARDS FROM THE ASSESSMENT FRAMEWORK FOR LIMITED FRAMEWORK ASSESSMENTS

Governance structure of Wageningen University and Research (WUR)

In contrast to many other Dutch Universities, WUR has just one faculty: the Faculty of Agricultural and Environmental Sciences. Therefore the governance structure of WUR differs from most other universities. The Rector Magnificus of the University is also the Dean of the Faculty. The Dean of the Faculty appoints the Programme Board, which consists of four professors and four students. The Programme Board is the legal governing body of the University's 18 BSc and 28 MSc degree programmes. It is responsible for the design, content, quality and financing of the programmes.

Each programme has its own Programme Committee, which consists of an equal number of students and staff members who are appointed by the Programme Board. Programme Committees advise the Programme Board on the design and content of their degree programmes. The Programme Board does not employ the lecturers; these are employed by the 94 Chair Groups, which generally include a Chair Holder (full professor), academic and support staff, postdocs and PhD students. The Programme Board, the Programme Committees and the Chair Groups together form the WUR education matrix organisation.

The Executive Board of WUR has appointed four Examining Boards (EBs), each responsible for a group of related degree programmes (domain) and Chair Groups. Examining Boards are independent from the Programme Board and include staff members from the domain. The Examining Boards assess the individual study programmes of students and award student degrees. The Examining Boards also appoint the course examiners and monitor changes to the assessment strategy of interim examinations in the annual education modification cycle. The Examining Boards assure the quality of the interim examinations, and for that reason periodically visit Chair Groups to discuss the validity and reliability of the assessments.

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

Profile

The master's programme Aquaculture and Marine Resource Management (MAM) starts from the premise that innovative and sustainable approaches to aquaculture and fisheries are necessary in order to preserve marine biodiversity and its ecosystem functions. The programme therefore aims to teach students an integrative approach to marine ecosystem management, in which biological and ecological knowledge are just as important as technological and socio-economic approaches. Students choose between three specialisations: (1) Aquaculture, (2) Marine Resources and Ecology and (3) Marine Governance.

The panel is pleased with the attractive multidisciplinary profile of the programme, which combines approaches from the natural, technological and social sciences and ties in well with the overall profile of WUR, which stresses the value of beta-gamma interaction. Compared to other programmes in the Netherlands and abroad, MAM is unique in its focus on the present interaction between humanity and the marine and aquatic environment, and on sustainable management and governance. Students indicated to the panel that the broadness of the programme, its emphasis on both research and application, as well as the inclusion of policy aspects attracted them to the programme.

Intended learning outcomes

The intended learning outcomes (ILOs) were adjusted after the 2016 assessment to emphasise that MAM aims to integrate a wide range of disciplines, ranging from marine ecology and aquaculture technology to marine economics and governance. Currently, there are ten ILOs, which are clustered into three domain specific learning outcomes (ILOs 1-3), a specialization-specific intended learning outcome (ILO 4a/b/c) and six general learning outcomes (ILOs 5-10). An overview of the ILO's can be found in appendix 1.

In the panel's opinion, the adjusted ILOs are generic but sufficiently clear. They match the broad multidisciplinary profile of the programme, for example by referring to integrated knowledge of technological, physiological, economics and social aspects of the use of aquatic organisms and marine ecosystems (ILO 1). The ILOs are linked to the Dublin descriptors, which ensures that the level and orientation are suitable. The strong emphasis on scientific research in the ILOs underscores the academic character of the programme.

Link with the professional field

As recommended by the previous panel, the programme has recently renewed its contacts with the professional field by setting up a new External Advisory Committee (EAC), which will meet annually to provide structural feedback to the programme. The current panel is pleased with this development. It notes that the ambition of the management is to achieve a better fit with the international labour market across the whole spectrum of the programme. The new EAC, which includes internationally renowned researchers (but as of yet no foreign members), will be able to play a role in achieving this objective. The panel recommends that the programme ensures sustained international input in the EAC, since many graduates find jobs outside the Netherlands. The panel also recommends to make use of all of the appropriate modern communication means to make the EAC as effective as possible. Besides the annual meetings of the EAC, the programme also regularly interviews representatives of the (international) professional field. According to the programme these one-on-one interviews are a particularly rich source of information.

Considerations

The panel is pleased with the broad multidisciplinary profile of the MAM programme. The integration of knowledge of aquaculture, marine ecology and marine governance gives the programme a unique position in the domain of Aquaculture and Marine Resource Management. The recently adjusted ILOs match the programme's profile and demonstrate a suitable level and orientation. Also, there is a clear connection with the professional field in the form of the newly reinstated External Advisory Committee.

Conclusion

Master's programme Aquaculture and Marine Resource Management: the panel assesses Standard 1 as 'good'.

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

MAM is a small sized, English-taught programme with an annual intake of 30-40 students. Roughly a third (31%) of students are non-Dutch. Admission to the programme requires pre-existing knowledge of ecology and animal biology, an adequate level of mathematics and statistics and sufficient English proficiency (IELTS score of at least 6.5). Students who enter from a WUR bachelor's programme (e.g. in Animal Sciences, Biology or Forest and Nature Conservation) have often prepared for the master's programme by taking the BSc minor *Marine Living Resources*.



The panel notes that 44% of students of the most recent cohort chose the Marine Resources and Ecology specialisation, which teaches them about mathematical models of ecological interactions, population dynamics and fishery yields, international regulations, management tools, and the economics of resource use. Another 33% of students opted for the Aquaculture specialisation, which deals with the culture of diverse types of aquatic organisms in culture conditions ranging from sea-based enclosures to semi-extensive ponds, high-tech on-land water recirculation systems, and integrated multi-trophic aquaculture. Finally, 23% of students followed the Marine Governance specialisation, which equips students with the knowledge of economics and political science that is necessary to analyse policy instruments, trade-offs and evaluations such as marine spatial planning, certification, and tradeable quota. The panel notes that students are also allowed to combine courses of two specialisations or complete two full specialisations (which involves extra credits and, usually, time).

The panel notes that the structure and design of the two-year curriculum (see appendix 2) are geared to the diverse and highly international student population. All students start with three compulsory courses (*Life History of Aquatic Organisms*; *Marine Systems*; *Trends in Aquaculture*), which provide them with an ecological, technological, and socio-economic knowledge base that the three specialisations can build upon. The rest of the programme is customizable. Supported by the study advisers, students choose a number of specialisation courses, including at least one thesis-preparation course, as well as a number of elective courses, including the so-called Academic Master Cluster (12 EC), which, amongst other things, contains skills courses. Electives can be selected from the full range of WUR courses. In the second year, students do an internship (24 EC) and work on their thesis (36 EC), which is offered by one of the six Chair Groups that are involved in the programme.

During the site visit the panel has discussed the curriculum structure, notably the first two periods, with management, students and staff. It concludes that the setup of starting with three common courses is not very popular amongst a significant part of the student population. Especially the students that completed the BSc minor *Marine Living Resources*, feel that there is too much overlap and that the nature of these courses is too general. They would prefer to exchange at least one of the introductory courses for a specialisation course, which means that they would be able to go in-depth sooner. While the panel understands the reasons for the chosen structure, it feels that the approach to the first two periods of the programme is rather organisation-centred. It also noted a certain disconnect between students' perception of the common part of the programme and that of staff members. All in all, the panel would suggest to rethink the current set-up in relation to its objectives (dealing with deficiencies, cohort building) and consider differentiating within courses in order to sufficiently challenge all students. During the site visit it became clear that the management is aware of the issues with respect to the level of, and overlap between, courses and aims to address them. A first step was the revision of the *Marine Systems* course in 2017-2018 in order to decrease overlap.

After studying material from a number of sample courses, the panel concluded that the general level and content of these courses is satisfactory. Important scientific and societal debates (for example on climate change and sustainability) are touched upon and the level of the courses is clearly academic. A course that the panel is particularly pleased with is the recently introduced compulsory course *Trends in Aquaculture*, which is a very good representation of the interdisciplinary and ambitious character of the programme. A curriculum matrix indicates that the programme as a whole covers all of the intended learning outcomes. Like the panel, students are largely positive about the content of the curriculum, which scored a 3,8 on a five-point scale in the national student survey (*Nationale Studenten Enquête*, NSE) of 2018. They specifically mentioned the thesis-preparing courses in the three specializations as very in-depth and of high quality.

The panel highly appreciates the effort to present students with an integrated, holistic perspective on the domain. It does, however, see potential for further integrating the specializations, which to some extent still function as separate pillars. Governance and social issues seem less central to the

programme than management and ecology. Students in these courses complement the portfolio with other courses at the University for deeper insights. The panel also agrees with students that certain important topics (like aquaponics, parasitology, immunology) are missing from the core curriculum. The panel is highly supportive of the recommendation made by the 2016 assessment panel to make more use of expertise that is already present at WUR (for example in the fields of selective breeding, health, immunology, food technology, food quality and safety) and to bring in additional expertise (for example on crustaceans) by inviting more guest lectures. An illustrative example is the specialisation course *Aquaculture Production Systems*, which includes very helpful information on recirculating aquaculture systems (RAS), a topic on which there is a lot of expertise at WUR, but hardly mentions the equally important pond-systems. From the interview with the management, the panel learned that efforts to include new topics have been set in motion since 2016. The strategy is to first introduce these in optional courses and later, after a positive response, include them in the compulsory courses. The management is also working on adding more thesis options at additional Chair Groups. The panel appreciates these activities to further broaden the programme.

The panel notes that the programme provides sufficient opportunities for students to prepare for an academic career, for example by allowing them to replace the internship with a second ('minor') thesis and by offering the university-wide *Research Master Cluster* course as part of the elective space. According to students, the connection with the non-academic labour market could be strengthened. A particular aspect that should be given more emphasis according to alumni is the training of entrepreneurial skills. Preparing students for starting their own companies seems particularly relevant since the Dutch labour market in the field of aquaculture is very tight. The panel agrees with this suggestion.

Teaching-learning environment

MAM offers students a high quality, small-scale teaching-learning environment. From its interview with students, the panel got the sense that students feel welcome at WUR and are proud to be part of the strong community of staff and students. The panel notes that students are very satisfied with the open and pleasant atmosphere in the programme, which scored a 4,5 in the 2018 NSE. Major strengths that were reported in the student chapter include the personal contact between students and staff members and the strong mutual support mechanisms that exist within the student community.

The programme uses a good variety of activating teaching methods that is in line with the ILOs and the WUR-wide vision on education, in which students are encouraged to take responsibility for their own learning process. Common forms of instruction are lectures, tutorials, computer practicals, lab practicals, field work and group work. Students are particularly pleased with the fact that almost all courses include practicals and tutorials, which gives them hands-on experience and creates a deeper experience of the theory. Another positive aspect is the use of innovative digital teaching methods, notably knowledge clips which students can use to prepare for lectures. Most courses include group assignments that 3-6 students jointly work on. The panel established that group work has a clear function in the increasingly international classrooms of the programme. It is valued by both staff and students as it provides an opportunity for students of different backgrounds to learn with, and from, one another and develop skills with respect to communication, cooperation and leadership that are seen as valuable for the labour market. An aspect that could be improved is the relatively low level of preparation for, and supervision during, group work. The panel recommends to set explicit learning goals for this type of work and (more) actively monitor group processes.

The panel concludes that the programme is feasible, even though a large part of the student population does not complete the programme within the appropriate time frame. Students indicated that the course load is reasonable and that the average time investment does not exceed 40 hours per week. The first two periods, which mainly consist of common courses, are seen as the most time intensive. According to students this is not due to the actual content of the courses, but rather to the fact that the courses include a lot of group work, which takes up quite a bit of time. On average students have 20 contact hours per week in the course phase of the programme, which is high for a



master's programme. Amongst the courses there are no real stumbling blocks, but the compulsory *Advanced Statistics* course is very challenging for some of the students.

The panel notes that the thesis and internship are relatively short compared to non-WUR programmes. According to staff and students, this is not necessarily a threat to the feasibility of the programme. Even so, many (Dutch) students voluntarily choose to extend their internship (from four to five or six months) and to spend more time on the thesis, with study delays as a result. International students experience a stronger incentive to finish within two years, mostly because of financial reasons. A point of improvement that was mentioned by students is that they would appreciate more guidance in finding internships and thesis projects. Especially international students experience difficulties in identifying good opportunities, which may be due to the fact that Dutch students are generally thought to be more proactive and persistent in approaching staff. The panel recommends to ensure that international students have equal opportunities in terms of internships and thesis projects. Study advisers could perhaps play a more prominent role in encouraging and empowering students to take charge of their learning process.

Students are generally pleased with the quality of guidance and supervision by staff members. With respect to thesis supervision, the panel established that practices vary across different Chair Groups. This is illustrated by the example of 'thesis rings', which function as intervision groups for students who are working on their thesis. The 2016 panel applauded the Chair Group which had already implemented thesis rings and recommended the others to follow suit. Even though the MAM lecture day in 2017 included a workshop on thesis rings, three out of six participating Chair Groups have not (yet) implemented thesis rings. The current panel repeats the desirability of creating equal opportunities for all students and hopes that thesis rings will soon be introduced programme- (and even WUR-)wide. With respect to student guidance, special mention should be made of the important role of the study advisers, who help students in creating feasible study paths. Students indicated that they highly appreciate the guidance offered by the study advisers, who are a low-threshold first point of contact for all matters related to the programmes.

A concern are the increasing numbers of students at WUR. While the intake of MAM itself is steady, the growth of other programmers that MAM shares courses with puts increasing pressure on the teaching-learning environment. Students made clear that they fear this trend may compromise the quality of their education. The panel has established that both the programme management and the Board of the University are well aware of the potentially negative side effects of growth. It was pleased to learn that the dean of education is preparing a proposal to preserve the small-scale education that is considered typical for WUR. This involves hiring additional staff and splitting up courses. When doing the latter, the panel suggests dividing up courses along programme lines, which would make it easier to fulfill the needs of particular groups of students. A course that would benefit from this approach is the compulsory introduction course *Life History of Aquatic Organisms*, which currently caters to approximately 80 students from Biology, MAM and some other master's programmes. Splitting the course would mean that MAM students could be presented with topics that are particularly relevant to them, such as plants, micro-organisms and invertebrates such as mollusks, which currently comprise a minor part of the course content.

A final topic that deserves mentioning, are the excellent facilities that the programme offers students. These include the state-of-the-art Carus Aquatic Research Facility (ARF), which houses experimental aquaria and basins.

Teaching staff

The panel is pleased with the quality of the teaching staff. Lecturers are experts in their fields, who actively participate in WUR research projects and are part of relevant international networks. 80% of the lecturers have obtained a PhD. Students see their lecturers as knowledgeable, approachable and didactically skilled. They mentioned to the panel that they particularly appreciate the fact that staff members are willing to use their network to help them find internships. In the 2018 NSE, students assessed their teachers with a score of 4,0 on a five-point scale. A point of improvement

that was mentioned by students concerns the level of English of lecturers, which in some cases could be improved.

The panel notes that didactic skills are considered important and lecturers are given sufficient opportunities to obtain a University Teaching Qualification (UTQ) and/or other qualifications that benefit their teaching. Approximately 70% of key lecturers in the master's programme currently have a UTQ, which is in well in accordance with the performance agreements (*prestatieafspraken*) between WUR and the ministry of Education, Culture and Science (OCW).

A promising development is that university-wide there seems to be a growing awareness that the current model of building careers on research rather than teaching is in need of reconsideration. The panel would fully support initiatives to fit teaching into the career development plan for staff, for example by creating positions for so-called Principle Educators (PE's) as a counterpart to Principle Investigators (PI's). This would not just benefit individual staff members with a particular interest in teaching, but also emphasize the importance of didactics in general. The panel was pleased to find that the central University currently offers some financial support for educational innovation initiatives. In order to enhance team building amongst lecturers and create a platform for discussing didactics and other issues related to teaching, a first annual lecture day was organised in 2017 and repeated in 2018. The panel applauds this initiative, which is a programme-specific counterpart of the WUR-wide annual lecture day.

A topic that was discussed extensively during the site visit is the high workload of staff members and the threat that it poses to the current level of interaction between staff and students. Growing numbers of students at WUR mean that staff members experience an increasing teaching burden that comes at the expense of their dedicated research time. Thesis supervision in particular takes up more and more time, with some lecturers supervising up to twelve students per year, which is a very high number. Particularly the Aquaculture and Fisheries Chair Group feels overwhelmed by the number of thesis students. Across the board, however, lecturers seem to agree that work pressure has reached the limits of what is acceptable. A positive takeaway from the interviews is that the high workload of staff has the attention of the programme management and Executive Board of the university. The panel hopes that solutions can soon be found to mitigate the negative effects of growth. Currently, the programme has a student-staff ratio of 19:1, which is slightly higher than the WUR-wide average of 17:1.

Considerations

The panel is generally satisfied with the structure and content of the curriculum, which is highly ambitious in its aim to provide students with an integrative perspective on the domain. It established that the curriculum as a whole sufficiently covers all of the intended learning outcomes. The panel also identified a number of opportunities for further improvement. In part, these have to do with the programme's response to the varying levels of knowledge with which its increasingly international student population enters the programme. In order to limit overlap and enable students to go in-depth at an early stage, the programme is invited to rethink the setup of the common courses in the first two periods. The panel also recommends to aim for teaching methods that could help fill in knowledge gaps and to keep a close eye on the admission criteria in order to make sure that all students who enter the programme are capable of realising the intended learning outcomes.

As for the objective of integration, the panel concludes that there could be more synergy between the three specializations. In terms of content, there are opportunities to make more use of existing knowledge of the WUR Chair Groups, many of whom are world-leading in fields that are highly relevant to aquatic production systems and marine resource management. Rather than allowing students to pursue important topics such as selective breeding, immunology and nutrition as part of their elective space, it would be preferable to include these in the core curriculum. The panel was pleased to learn that the management is already exploring options to further broaden the curriculum.



A major strength of the programme is its teaching-learning environment, which is characterised by a strong sense of community and close interaction between students and staff. The teaching methods that are used are sufficiently varied and match the intended learning outcomes. Most courses include a useful combination of individual and group work. The panel would advise to ensure that students are sufficiently prepared for and supervised during group work. This also includes setting explicit learning goals for group work. Many of the courses, especially the specialisation courses, are relatively small-scale and interactive. The panel hopes that the current level of small-scale education can be maintained and perhaps even increased by splitting up some of the larger courses that are shared with other programmes. Worth mentioning is the state-of-the-art Carus Aquatic Research Facility (ARF), which is available to students.

The teaching staff of the programme is motivated and qualified. Lecturers are knowledgeable in their respective fields and often have extensive didactic experience. Roughly 70% have obtained an UTQ. The increasing workload of staff members requires intensive monitoring by the management of the Chair Groups and the central university.

All in all, the panel concludes that the curriculum, teaching-learning environment and staff of the programme enable students to realise the intended learning outcomes. It established that the programme is feasible, even if not all students (choose to) complete it within the appropriate time frame.

Conclusion

Master's programme Aquaculture and Marine Resource Management: the panel assesses Standard 2 as 'satisfactory'.

Standard 3: Student assessment

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

Findings

System of assessment

The panel established that WUR has a sound assessment policy. In 2017, WUR renewed its vision on education alongside its education assessment policy. This assessment policy defines why and how WUR assesses and how the roles and responsibilities are distributed. Its goal is to generalise assessment rules and policies and to make them transparent to both lecturers and students.

The system of assessment that is in use within MAM is based on the WUR-wide policy. The panel was pleased to find that there is sufficient attention for the validity, reliability and transparency of assessment. For each course an assessment strategy is drawn up, in which the course specific learning outcomes are linked to assessment methods. The assessment strategies make clear how and when a learning outcome is assessed, who is involved in assessing students and how the final grade is determined. By publishing the assessment strategies in the Study Handbook the programme ensures that students are well aware of what is expected of them. Course examiners are responsible for test design and checking test results. To ensure the quality and reliability of marking, they use model answers for essay questions, answer keys for multiple choice questions and rubrics for essays and papers.

The panel has established that the combined assessment of all courses covers the full range of intended learning outcomes. A positive aspect is that the majority of courses use a range of assessment methods, including open and closed book examinations (either with essay questions or closed questions), oral presentations, individual and group reports/papers and peer review. These methods are generally well aligned with the learning goals and teaching methods. During the site visit, the panel studied assessments and answer models of a number of sample courses. It found the overall level of these exams adequate. The assessment sufficiently addresses all of the relevant

cognitive levels. Questions are often open-ended or multiple choice, but true/false questions are also sometimes used. As these are susceptible to guessing and tend to measure reproduction of factual knowledge rather than comprehension, the panel would advise limiting the use of such questions.

From its interviews with stakeholders, the panel concludes that all parties involved are generally pleased with the assessment procedures and quality of examination. Assessment scored a 3,8 on a five-point scale in the 2018 NSE. An issue that was raised by students is that a large part of the final grade is often based on group work, which is not individually assessed. Students tend to dislike this, because it invites freeriding and makes it more difficult for good students to excel. The panel advises to use group work wisely: not merely for the sake of minimising staff workload, but aligned with assignments that truly require and assess collaboration skills. The panel notes that clear learning goals should be set for this type of work and that these goals should be part of the assessment. At the moment it is not clear to the panel that this is always the case. Promising new developments include the use of formative mid-term tests, implemented to provide students with feedback during the course. The panel supports the intention of exploring further possibilities of the use of self-tests and peer review.

Thesis assessment

The programme is concluded with both an internship and a thesis. The thesis is seen as central to the successful completion of the programme. At least two assessors are involved in the assessment of the thesis: the supervisor(s) and an independent examiner (second reader). To ensure continuity, Chair Groups generally have one examiner who is responsible for the quality of all thesis assessments. The thesis assessment covers a number of different aspects: the research competence, the thesis report, the presentation and the defense. These are scored on a standardised WUR-wide assessment form.

The panel established that exact procedures for assessing the thesis vary across Chair Groups. For example: the weighting of the different components of the thesis project is decided at the Chair Group level within the range set by the Examining Board. This makes it possible for the assessment to properly reflect the differences between social science and natural science research. Another example of the liberties that the Chair Groups have with respect to thesis assessment is that not all of them make use of the WUR-wide thesis rubric, even though this is recommended by the Examining Board. To ensure validity, reliability and transparency, the panel advises to introduce thesis rubrics in all Chair Groups.

Further steps can also be taken in the correct use of the thesis form. The panel found that signatures from second and third assessors were often missing on the sample forms that it studied. There is also substantial variation in the level of qualitative feedback. In some cases the fields for qualitative comments contain little feedback. While this does not imply that useful feedback has not been given (e.g. orally), it does mean that students lack a written record of the feedback they received and that it is more difficult for external reviewers to validate the grade that was given. Another issue that needs to be addressed is the fact that the assessments of both assessors are recorded on a single assessment form. To enable external reviewers to establish that both readers have independently phrased their assessment, it is preferable to have each assessor fill out a separate form and administrate both forms. A general recommendation that the panel would like to make is to further streamline the thesis process by digitalisation. This would make it possible to automatically reject forms with insufficient qualitative feedback, missing signatures etc.

Notwithstanding these suggestions for further improvement of procedures, the panel found that the assessment of theses itself is sound. The panel agreed with the grades given to the theses that it studied as part of the review. Students that the panel spoke with are generally pleased with the thesis procedures and assessment. Staff members also feel that the current assessment strategy works well.



Examining Board

At WUR there are four Examining Boards (EBs), each responsible for the assurance of the quality of examination of a group of related degree programmes. The Executive Board of the University appoints EB members and at least one member is independent (not affiliated to the programmes). For each course a member of the lecturing staff is appointed as examiner by the responsible EB. The examiner is responsible for the assessment strategy of the course.

As a general rule, the EB that is responsible for MAM visits the Chair Groups every six years, accompanied by an assessment expert. It checks a sample of theses and internship assessments and discusses the validity, reliability and transparency of the assessments. Where necessary, it proposes improvements. The most recent EB visit to a Chair Group in the programme took place in 2017 and involved the (new) Marine Animal Ecology group. The result was very positive. A minor comment that was made related to the specific formulation of course learning outcomes.

Although the panel has no particular concerns with respect to the quality of assessment, it does note that the current university-wide system of quality assurance poses some challenges. There is considerable distance between the EB and the Chair Groups, which operate with a large measure of autonomy. The limited means that were available to the EBs over the reporting period (as exemplified by the limited frequency of Chair Group visits) meant that these may lack agency in properly streamlining procedures across Chair Groups and following up on prior recommendations. The panel was very pleased to learn that the Executive Board of WUR is doubling the resources for Chair Groups as of 2019. Even so, it does advise the university to carefully consider how these resources can be used to their optimal effect.

Considerations

Assessment in the programme is based on a solid system which is in line with the WUR-wide assessment policy. Sufficient attention is paid to the validity, reliability and transparency of examinations. The overall level of sample tests studied by the panel is adequate and the combined assessment of all courses covers the full range of intended learning outcomes.

The procedures for assessing the final product of the programmes, the thesis, are sensible and the assessment itself is sound. Exact practices vary somewhat across Chair Groups. To further increase the transparency and comparability of thesis assessment, the panel recommends that all groups use rubrics. It also advises to introduce separate assessment forms for both assessors and to digitise the different steps in the assessment procedure.

Finally, the panel established that the Examining Board safeguards the overall level of assessment in the programmes to the best of its abilities. Increasing the capacity of the EB, as is the intention of the Executive Board, could help to strengthen its agency in relation to the rather autonomous Chair Groups. Nonetheless, the panel feels that the central university should also critically reconsider whether the design of the current quality assurance system optimally suits its purposes.

Conclusion

Master's programme Aquaculture and Marine Resource Management: the panel assesses Standard 3 as 'satisfactory'.

Standard 4: Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.
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Findings

Prior to the site visit the panel studied fifteen recently completed theses, which were all found to be of adequate quality. The sample theses reflect the broad character of the programme. They deal with a variety of relevant issues in the domain of aquatic production systems and marine resource management and are based on either qualitative or quantitative methods/mathematical modeling. The panel found that statistics are not necessarily part of all theses and would recommend to make

some form of data analyses a compulsory part of each thesis. A particular observation is that the theses in marine governance do not seem to cover traditional governance issues including analysis on international relations, power, actors or discourses, as the panel would have expected. The panel recommends to make more use of the expertise available in the Chair Groups that contribute to the Marine Governance specialisation to support students selecting traditional governance issues to be on the same level with other programmes offering policy and governance majors. All in all, the panel is sufficiently convinced that graduates achieve the intended learning outcomes of the programme.

The position of graduates on the labour market underscores that students achieve the intended learning outcomes. The panel established that graduates find employment in a broad variety of positions and sectors, consistent with the integrative character of the programme. Many work in aquaculture and fisheries companies, while others join research organisations, consultancy firms, governmental agencies and NGOs. More than 40% of students have already found employment at the moment of graduation. Career opportunities are more plentiful on the international than on the Dutch labour market. In the future, the programme intends to stress this more strongly in its recruitment efforts, so as not to create false expectations amongst prospective students. The alumni that the panel spoke with indicated that they feel that the programme has sufficiently prepared them for their current position. A general observation that the panel would like to offer is that efforts could be made to establish alumni policies at programme level. From the interviews, the panel established that initiatives in this respect are currently limited to the central university level. Existing alumni relations at programme level are mostly informal, which means that the possibilities that alumni have to offer are not optimally used.

Considerations

Both the sample theses that were studied by the panel and the position of graduates indicate that students achieve the intended learning outcomes of the programme. The general level of the final projects is satisfactory: the work is of sufficient academic quality and adequately reflects the broad, multidisciplinary profile of the programme. Graduates find employment in a broad range of relevant positions and sectors. Alumni generally feel that the programme has provided them with a solid foundation from which they can benefit in their respective careers.

Conclusion

Master's programme Aquaculture and Marine Resource Management: the panel assesses Standard 4 as 'satisfactory'.

GENERAL CONCLUSION

The panel is convinced that the programme meets the criteria for a positive assessment on all four standards. Since the (very recent) assessment of 2016, the programme has initiated further improvements to the teaching-learning environment and system of assessment. The panel applauds the atmosphere of continuous improvement that exists within the programme.

Conclusion

The panel assesses the *master's programme Aquaculture and Marine Resource Management* as 'satisfactory'.



APPENDICES



APPENDIX 1: INTENDED LEARNING OUTCOMES

		Dublin descriptors				
		Have knowledge and understanding	Apply knowledge and understanding	Making judgements	Communication	Learning skills
After successful completion of this MSc programme graduates are expected to be able to:						
For all specialisations:						
1	integrate knowledge of technological, physiological, ecological, economic and social aspects of the use of aquatic organisms and marine ecosystems.					
2	analyse critically the social and ecological dynamics of the utilisation of marine resources, and the conservation and restoration of marine ecosystems.					
3	compare different stakeholder views on socio-ecological aspects of marine ecosystems and aquatic production systems.					
For specialization Aquaculture:						
4a	to design ecologically, economically, and socially sustainable production of fish and other marine organisms in a global perspective.					
For specialization Marine Resources and Ecology:						
4b	to evaluate biodiversity, environmental quality and sustainability of marine ecosystems for the design of management of the marine environment.					
For specialization Marine Governance:						
4c	to evaluate existing socio-economic arrangements in order to design strategies for the governance and management of sustainable marine ecosystems and aquatic resources.					
For all specialisations:						
5	design a research plan in which the problem definition, hypothesis, research objectives and research questions are described in relation to relevant literature.					
6	apply appropriate research methods and techniques, including gathering new information and integrating this in existing theories in order to test the scientific hypotheses by gathering new information and by integrating this in existing theories.					
7	assess the ethical and societal consequences of production of aquatic organisms and use of marine ecosystems, define dilemmas and design possible solutions.					
8	co-operate in an interdisciplinary and international team to perform project-based work.					
9	communicate clearly (verbally and in writing) about the results of project and research work with specialists and non-specialists, considering the nature of the target group.					
10	reflect upon personal knowledge, skills, attitudes and functioning, both individually and in discussions with others and design and plan their own study path.					

APPENDIX 2: OVERVIEW OF THE CURRICULUM

(Year 1 + Year 2)

A- Aquaculture

	Period 1 Sep/Oct	Period 2 Nov/Dec	Period 3 Jan	Period 4 Feb	Period 5 Mar/Apr	Period 6 May/June	Jul/Aug
Morning	Life History of Aquatic Organisms	Aquaculture Production Systems	Optional	Optional	Advanced Statistics*	"European Workshop Environmental Sciences and Management or Academic Consultancy Training + MOS Modules	Holidays
Afternoon	Marine Systems	Trends in Aquaculture	Holidays	Re-exams	Nutrition, Welfare and Reproduction in Aquaculture		

B - Marine Resources and Ecology

Morning	Life History of Aquatic Organisms	Complexity in Ecological Systems or Advanced Statistics*	Marine Resources Management	Re-exams	Fisheries Ecology or Water Quality	Environmental Toxicology or Marine Animal Ecology	"European Workshop Environmental Sciences and Management or Academic Consultancy Training + MOS Modules	Holidays
Afternoon	Marine Systems	Trends in Aquaculture						

C - Governance

Morning	Life History of Aquatic Organisms	Env. Policy: Analysis and Evaluation or Env. Economics for Env. Sciences	Marine Resources Management	Re-exams	Econ. and Management of Natural Resources or Globalization and Sustainable Food Prod. and Cons.	Advanced Statistics*	"European Workshop Environmental Sciences and Management or Academic Consultancy Training + MOS Modules	Holidays
Afternoon	Marine Systems	Trends in Aquaculture						

Year 2

Morning	Major Thesis (36 EC)		Holidays	Re-exams	Internship or Minor Thesis (24 EC)	Holidays
Afternoon	Research Master Cluster	Holidays				

- compulsory
- compulsory for specialisation
- choose at least one for your specialisation, rest free choice
- choose if your study advisor deems it necessary
- choose one cluster
- free choice



APPENDIX 3: PROGRAMME OF THE SITE VISIT

23 Oktober MSc Aquaculture and Marine Resource Management		
14.00	15.30	Arrival of panel, internal meeting and documentation review
15.30	16.15	Interview with management (including programme committee)
16.15	16.30	Break
16.30	17.00	Alumni
17.00	17.30	Internal deliberation panel, short recap day 1

24 Oktober		
8.45	10.00	Arrival of panel, internal meeting and documentation review
10.00	10.45	Students
10.45	10.50	Mini break
10.50	11.35	Teaching staff
11.35	11.45	Break
11.45	12.15	Examining Board and Study Adviser(s)
12.15	13.30	Lunch and Deliberations panel
13.30	14.15	Final interview with management
14.15	15.30	Deliberations panel and formulating preliminary findings and conclusions
15.30	15.45	Feedback of preliminary findings and conclusions

APPENDIX 4: THESES AND DOCUMENTS STUDIED BY THE PANEL

Prior to the site visit, the panel studied fifteen theses of the master's programme Aquaculture and Marine Resource Management. Information on the selected theses is available from QANU upon request.

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

- Annual report Examining Board 2017
- Reports Programme Committee
- Minutes External Advisory Board
- Assessment policy WUR
- Teaching and Exam Regulation 2018-2019

The panel also studied materials of the following four courses:

- Trends in Aquaculture (common part course)
- Fisheries Ecology (thesis preparing course)
- Marine Governance (thesis preparing course)

