



Decision of the Accreditation Commission of AQAS

on the Master degree programme

“Aquaculture” (Master of Science)

and on the Ph.D. degree programme

“Aquaculture and Fisheries Science” (Ph.D.)

offered by

Lilongwe University of Agriculture and Natural Resources,

(Bunda Campus), Malawi

Based on the report of the expert panel and the discussions of the Standing Commission in its 4th meeting on 17th February 2020, the Standing Commission decides:

1. The study programmes **“Aquaculture” (Master of Science)** and **“Aquaculture and Fisheries Science” (PhD)** offered by **Lilongwe University of Agriculture and Natural Resources (Bunda Campus), Malawi** are accredited according to the AQAS criteria for Programme Accreditation.

The accreditations are conditional.

The study programmes essentially comply with the requirements defined by the criteria and thus the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) and the European Qualifications Framework (EQF) in their current version. The required adjustments can be implemented within a time period of nine months.

2. The conditions have to be fulfilled. The fulfilment of the conditions has to be documented and reported to AQAS no later than **30 November 2020**.
3. The accreditation is given for the period of **six years** and is valid until **30 September 2026**.

Conditions:

Both programmes:

1. The intended learning outcomes on programme level have to be described in a more elaborate way to specify the profile of the graduates. The intended learning outcomes also have to include interdisciplinary and societal needs. This has to be done separately for the Master programme and the PhD programme.

Master programme:

2. Based on the outcome of the analysis of which courses are essential to achieve the learning outcomes on programme level, it has to be shown how the overall learning outcomes are achieved by the combination of modules, e.g. by using a matrix.
3. It has to be guaranteed that students have sufficient knowledge in Mathematics and Statistics. This can either be done by sharpening the admission criteria or by expanding the amount of Mathematics and Statistics in the curriculum.
4. The module descriptions have to be revised, focusing on the following aspects:

- a. The intended learning outcomes have to be described in a more elaborate way.
- b. The type of examination(s) used must be clarified.

The conditions were fulfilled on time.
The Standing Commission confirms this with its decision of 31 May 2021..

The following **recommendations** are given for further improvement of the programmes:

Both programmes:

1. The interaction with the regional and local labour market should be strengthened. A special focus shall be put on the following:
 - a. Stakeholder meetings with labour market representatives should happen on a more regular basis to identify labour market needs.
 - b. The interaction with the labour market should be used in a way that a stronger focus is laid on practical-oriented issues from local farmers and the private sector in Malawi and their neighbouring countries.
2. The panel of experts suggests implementing a “tracer study” to be able to provide data on alumni.

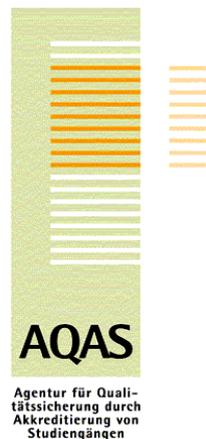
Master programme:

3. To enhance the link between theory and practice in the courses, students should be offered more possibilities to apply theoretical knowledge in hands-on experience, e.g. in project planning, design, and conducting, case studies, or the like.
4. To give students the possibility of specialisation, a reduction of compulsory courses in favour of electives should be considered, also to reach a more even distribution of the workload over the semesters.

PhD programme:

5. The authorship criteria for scientific papers of PhD students should be defined in an official document, e. g. the curriculum description.
6. In order to strengthen the exchange of PhD students of the programme, the Department should consider the following steps:
 - a. Interdisciplinarity should be fostered for PhD students of different departments and faculties of LUANAR by establishing an annual Science Day or a comparable event.
 - b. The Department should raise its efforts to internationalize the programme, e.g. by implementing “sandwich programmes”.
7. To enhance the visibility of the programme internationally, the potential of establishing a research campus by installing post doc programmes should be discussed.
8. Current research foci and on-going research projects should be published on the website. This might increase the visibility of the programme.

With regard to the reasons for this decision the Standing Commission refers to the attached assessment report.



Experts' Report

on the Master degree programme

“Aquaculture” (Master of Science)

and on the Ph.D. degree programme

“Aquaculture and Fisheries Science” (Ph.D.)

offered by

Lilongwe University of Agriculture and Natural Resources,

(Bunda Campus), Malawi

Visit to the University: 4th–9th November 2019

Panel of experts:

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| Prof. Dr. Bela Buck | University of Applied Sciences Bremerhaven, Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Centre for Maritime Research and Development |
| Prof. Dr. Johan Verreth | Wageningen University (The Netherlands), Aquaculture and Fisheries Group |
| Dr. Adrian Piers | Fisheries, Aquaculture and Environmental Consulting, Lusaka (Zambia) (representative from the labour market) |
| Lena Feige | Ph.D. student at Institut Pasteur Paris (France) (student expert) |

Coordinators:

Ninja Fischer and Patrick Heinzer AQAS, Cologne, Germany

I. Preamble

AQAS – Agency for Quality Assurance through Accreditation of Study Programmes – is an independent non-profit organisation, supported by more than 90 member institutions, both higher education institutions (HEIs) and academic associations. Since 2002, the agency has been accredited by the German Accreditation Council (GAC). It is therefore a notified body for accreditation of higher education institutions and programmes in Germany.

AQAS is a full member of ENQA and also listed in the European Quality Assurance Register for Higher Education (EQAR) which confirms that our procedures comply with the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG), on which all Bologna countries agreed as a basis for internal and external quality assurance.

AQAS is an institution founded by and working for higher education institutions and academic associations. The agency is devoted to quality assurance and quality development of both academic studies and teaching in Higher Education Institutions. The activities of AQAS in accreditation are neither restrained to specific academic disciplines or degrees nor to a certain type of Higher Education Institution

II. Accreditation procedure

This report results from the external review of the Master programme in “Aquaculture” (Master of Science) and the Ph.D. programme “Aquaculture and Fisheries Science” (Ph.D.) offered by Lilongwe University of Agriculture and Natural Resources (LUANAR) in Lilongwe/Malawi.

1. Criteria

The Master programme is assessed against a set of **criteria for programme accreditation** developed by AQAS. The criteria are based on the “Standards and Guidelines for Quality Assurance in the European Higher Education Area” (ESG) 2015. To facilitate the review each criterion features a set of indicators that can be used to demonstrate the fulfilment of the criteria. However, if single indicators are not fulfilled this does not automatically mean that a criterion is not met. The indicators need to be discussed in the context of the programme since not all indicators necessarily can be applied to a programme.

The Ph.D. programme is assessed against the AQAS **criteria for the accreditation of structured doctoral programmes**. The accreditation by AQAS is based on the following key concepts:

- The doctoral thesis is an independent, original academic piece of research. It can take the form of a monograph or a cumulative dissertation. The assessment of the originality is based on a set of criteria:
 - selection of the research topic,
 - formulation and development of questions around the research topic,
 - decision regarding the use of suitable methodological tools and methods,
 - the scientific research, and
 - the discussion and publication of research results.
- Doctoral programmes should foster subject-specific knowledge and, if possible, facilitate cross-disciplinary perspectives and inter-disciplinary exchanges.
- Doctoral programmes are carried out and completed within a specific timeframe.

The panel of experts was asked to assess both programmes on the basis of the relevant criteria and discuss the programmes separately, when needed.

2. Approach and methodology

The initialisation

The Lilongwe University of Agriculture and Natural Resources mandated AQAS to perform the accreditation procedure in March 2019.

The University produced a Self-Evaluation Report (SER) which describes both programmes (Master and PhD). In April 2019, LUANAR handed in a draft of the SER together with the relevant documentation of the study programme and an appendix.

The appendix included e.g.:

- Overview over statistical data of the student body (e.g. number of applications, beginners, students, graduates, student drop outs),
- CVs of the teaching staff,
- information on student services,
- core information on resources,
- Academic regulations for Master and PhD-programmes.

AQAS checked the SER regarding completeness, comprehensibility and transparency. The final version of the SER was handed in August 2019.

The accreditation procedure was officially initialised by a decision of the AQAS Standing Commission on May 2019.

The nomination of the panel of expert

The composition of the panel of experts follows the stakeholder principle. Consequently, representatives from the respective discipline/s, the labour market and students are involved. Furthermore, AQAS follows principles for the selection of experts of the European Consortium for Accreditation (ECA).

The Standing Commission nominated in July 2019 the before mentioned expert panel. AQAS informed the university about the members of the expert panel and the university did not raise any concerns against the composition of the panel.

The preparation of the site visit

Prior to the site visit, the experts reviewed the SER and submitted a short preliminary statement including open questions and potential needs for additional information. AQAS forwarded these preliminary statements to the University and to the panel members in order to increase transparency in the process and the upcoming discussions during the site visit.

The site visit

After a review of the Self Evaluation Report, a site visit to the University took place from 4th to 9th of November 2019. On site, the experts interviewed different stakeholders, e.g. the management of the HEI, the programme management, teaching and other staff, as well as students and graduates, in separate discussions and consulted additional documentation as well as student work. The visit concluded by the presentation of the preliminary findings of the group of experts to the University's representatives.

The report writing

After the site visit had taken place, the expert group drafted the following report, assessing the fulfilment of the AQAS criteria for the programme accreditation. The report included a recommendation to the Accreditation Commission. The report was sent to the University for comments.

The decision

The report, together with the comments of the department, forms the basis for the AQAS Standing Commission to make a decision regarding the accreditation of the programme. Based on these two documents, on 17th of February 2020 the AQAS Commission took its decision on the accreditation. AQAS forwarded the decision to the university. The university had the right to appeal against the decision or any of the imposed conditions.

In May 2020, AQAS published the report and the result of the accreditation as well as the names of the panel of experts.

III. General Information on the University

Lilongwe University of Agriculture and Natural Resources (LUANAR), founded in 2012, originated from Bunda College of Agriculture which was a constituent college of the University of Malawi established in 1965. LUANAR was created by an Act of Parliament in 2011 and operationalized on 1st July 2012. Since then, LUANAR has expanded in terms of faculties, departments, programmes and campuses. With three major campuses of Bunda, NRC and City, and Open and Distance Learning (ODL) centres in Lilongwe, Blantyre and Mzuzu, the university had close to 9,000 students when handing in the self evaluation report (SER). Presently LUANAR has five faculties, namely Faculty of Agriculture with five departments, Faculty of Food and Human Science with three departments, Faculty of Development Studies with four departments, Faculty of Natural Resources with three departments and Faculty of Postgraduate Studies which coordinates all postgraduate programmes including both programmes under review. LUANAR has three directorates which support teaching, research and outreach as well as student welfare namely Directorate of Quality Assurance, Directorate of Research and Outreach and Directorate of Student Affairs.

The Africa Centre of Excellence in Aquaculture and Fisheries (AquaFish ACE) belongs to the department of Aquaculture and Fisheries Science at the Faculty of Natural Resources which offers Bachelor, Master and PhD programmes. The Faculty of Natural Resources hosts three departments: in addition to the Department of Aquaculture and Fisheries Science, the Department of Forestry, and the Department of Environmental Science and Management. The department is led by the Head of Department with his deputy (who also coordinates postgraduate programmes). In terms of branches, the department hosts the Regional Fish Node, one of the nodes established by New Partnership for Africa's Development (NEPAD) by the African Union in 2006, and in August 2016 the department has also been designated African Centre of Excellence, funded by the World Bank until 2021. The third branch is the Aquaculture farm which is headed by the Farm Manager, and it has facilities used for both teaching and research, as well as income generation for the department.

Following the need for technical human resources in aquaculture and fisheries manifested through the Regional Fisheries Training Programme Report, Bunda College of Agriculture was given the mandate by the Southern African Development Coordination Conference (SADC) countries to offer specialized training in aquaculture and fisheries science at degree level (and higher) to students from both Malawi and the SADC region. Since the regional training programme commenced in 1994, more than three hundred students from Angola, Botswana, Lesotho, Mozambique, Namibia, Swaziland, Tanzania, Zambia, Zimbabwe and Malawi have so far completed their training in Aquaculture and Fisheries Science at diploma and degree levels at Bunda College. Recently, there are

students not only from the SADC region but also e.g. from countries like Burundi, Ethiopia, Ghana, Kenya, Rwanda, Sudan and Uganda.

The rationale for offering the Master programme in aquaculture is given to align with government policies of increasing fish production through aquaculture, therefore requiring human capacity building in the field. According to the university's report, a demand for a PhD programme in aquaculture and Fisheries Science was identified from consultation missions commissioned by the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) to assess the human resource and research needs in Eastern and Southern Africa.

IV. Assessment of the study programmes

1. Quality of the Curriculum / Aims and structure of the doctoral programme [ESG 1.2]

The intended learning outcomes of the programme are defined and available in published form. They reflect both academic and labour-market requirements and are up-to-date with relation to the relevant field. The design of the programme supports achievement of the intended learning outcomes.

The academic level of graduates corresponds to the requirements of the appropriate level of the European Qualifications Framework.

The curriculum's design is readily available and transparently formulated.

Study programme objectives

The Aquaculture and Fisheries Science Department's vision is to become a centre of excellence in training and research in Aquaculture and Fisheries Science in Malawi and the SADC region. Its mission statement is to advance and promote knowledge and skills in aquaculture, fisheries science, natural resources and the environment for increased and sustainable fish production and utilization through teaching, research, outreach, and consultancies and conservation of biodiversity, natural resources and the environment in response to national and international needs. As outlined in the SER, the subject-related and cross-subject-related qualification objectives are aquaculture Production, aquaculture and fisheries economics, fish nutrition, fish breeding and fisheries management for the Master and the PhD programme. Each curriculum is supposed to enhance qualifications that shall enable its graduates to start their own aquaculture farms, manage aquaculture industries and manage fisheries ecosystems. Furthermore, each programme is to equip students with skills to manage all aspects of the fish value chain and other disciplines such as education and agribusiness management and be able to interpret issues in aquaculture and cross subjects.

Master programme

Additional to the overall aspects of the vision and mission of the department, the main aim of the Master programme is to produce highly skilled professionals with the ability to design, or operate, or manage aquaculture facilities, and provide relevant policy recommendations for the advancement of aquaculture in Malawi, the region and beyond. Therefore, the university states that the programme aims at training graduates from Malawi, the region and beyond to utilize different experiences drawn from across the globe geared at tackling global challenges faced in aquaculture as a fast-developing food industry *vis-à-vis* population growth, increased food and nutrition needs, declining fisheries resources and climate change.

PhD programme

The objectives of the programme are to develop and build capacity in order to support economic advancement of the RUFORUM region, especially in the aquaculture and fisheries sector, to equip students with a deeper understanding of the theoretical framework underlying aquaculture and fisheries sciences and practices, and with skills in articulating aquaculture and fisheries issues for

public and private sectors, as well as, for international and non-governmental organizations, and to strengthen regional collaboration while rationalizing the use of existing resources (human and physical) in the region. The programme is supposed to react on the requirement of well-trained and qualified staff to address various problems in the need to increase fish production from aquaculture to supplement the declining production of fish from capture fisheries. The students are supposed to understand the dynamics of the problems surrounding aquaculture and capture fisheries management to be able to develop remedial interventions. The integration of course work shall provide students with a strong practical and theoretical base and analytical skills.

Curricular Structure

The Master programme comprises one year of course work and one year of conducting a research project about which a thesis is produced and presented. The PhD programme involves one year of coursework and a three- to four-years research project in the area of the student's interest in any aspect of the fish value chain.

Master programme

All students have to take the core courses in semester one and semester two. In addition, a student takes two elective courses in semester two upon approval by the major supervisor depending on the research area of the student. Continuation into the second year, i.e. conducting research, is granted on the condition that the student passes the first-year courses.

The first semester is comprised of the following core courses: Aquaculture Seminar, Biometry and Computing, Fish Physiology and Bioenergetics, Fish Health and Welfare Management, Fisheries and Aquaculture Policy and Planning, Water Quality Analysis and Management, Aquaculture Production Systems, Aquaculture Business Management.

In the second semester, the students have to take the following core courses: Aquaculture Seminar, Fish Quality Management, Project Development and Management, Fish Nutrition and Feed Technology, Integrated Agriculture Aquaculture Systems, Fish Genetics and Biotechnology.

The department offers the following elective courses: Instrumentation in Fish Nutrition, Fish Breeding and Hatchery Management, Fish Reproduction and Endocrinology, Aquaculture Engineering, Intensive Aquaculture Production Technologies, Fisheries Value Chains and Marketing, Applied Biochemistry, Environmental Economics and Management.

The second year is used for research, data analysis, thesis writing and final examinations. Research is to be done within the first five months, then a mid-year evaluation including a presentation on preliminary results is given. Afterwards, the students draft the research paper, get an evaluation at the end of the year, draft the thesis and undergo the thesis examination. The course of studies ends with the submission of the thesis and graduation.

PhD programme

The first three semesters comprise course work, the development of a concept note and of the research proposal. If the exams of the course work are passed, the student proceeds to the candidacy exam which has to be passed to get into the research phase. In the second year, a mid-year evaluation is carried out including preliminary results, the research paper is drafted and an end of year-evaluation is provided. The second year is structured similarly including proceeding with research, a mid-year evaluation, the handing in of a second research paper, and the draft of the thesis. At the end of the studies, the thesis is submitted and the students graduate.

Five core courses have to be attended by the students in the first year regardless of their area of specialization of which the students can choose between Aquaculture Production Technology and Fisheries Science and Management. These core courses are Aquaculture and Fisheries Economics, Fisheries and Aquatic Resources Management, Molecular Biology and Genetics, Biostatistics

and Research Methods, and Life Skills and Personal Development. Additionally, the students have to take four courses from their chosen area of specialisation and at least two electives. The core courses of the first specialization are: Aquaculture Nutrition and Feed Technology, Aquaculture Production Systems and Engineering, Fish Reproduction and Breeding, and Water Quality Management. The second is comprised of: Advanced Fish Population Dynamics and Stock Assessment, Fisheries Ecology, Limnology and Oceanography, Advanced Resources Economics and Management. Elective courses can be chosen from the following: Business Management in Aquaculture, Biotechnology Applications in Aquaculture, Integrated Agriculture and Aquaculture Systems, Fish Bioenergetics, Fish Taxonomy and Systematics, Fisheries Bioeconomics, Theory Modelling and Management, and Fish Quality Management. Thus, each student takes at least eleven courses. The course work is to be completed in three semesters while research work shall take on for an average of five semesters. The students sit for an examination immediately after completing the course work. Each candidate is required to have at least one published peer reviewed journal paper as a requirement for the award of the PhD degree.

Organisation

According to the SER, the curricula of both programmes are developed jointly by academic and technical members of the staff together with stakeholders from the industry and other universities. Courses are supposed to be reviewed periodically. Overlaps among courses should be identified and removed. The Dean of Faculty and the Director of Quality Assurance are responsible for overseeing the process. For the PhD programme, there is an International Academic Advisory Board that should oversee its quality and ensure that it addresses the needs of the region.

Experts' evaluation

Master programme

Study Programme Objectives and Intended Learning Outcomes

The main objective of the Master programme is to produce highly skilled professionals with the ability to design, operate, or manage aquaculture facilities. In line with this objective, entrepreneurship is regarded by the University and programme management as the most crucial skill the programme wants to convey to the students. Therefore, management skills, presentation skills and a basic understanding of economics are regarded as necessary soft skills to be taught to the students of the programme. The curriculum of the Master programme tackles these needs in an adequate manner. Besides, the university seems to appreciate the societal role its graduates will have as it has the ambition to train them to tackle global challenges faced in aquaculture concerning human population growth, increased food and nutrition needs, declining fisheries resources and climate change. This ambition requires students to understand and account for the trade-offs between the drive for technological development and their actions as a future professional expert on one hand and the search for the conservation of biodiversity and ecosystem services and human, social needs on the other hand.

The curriculum is clearly designed to provide students with a broad basis of theoretical and practical knowledge in the field of aquaculture. They learn to understand, analyse, interpret and apply theories of basic disciplines such as fish breeding, fish nutrition, fish health, and water quality management. The panel of experts was delighted by the general application of blended course modules, e.g. using a mix of classroom lectures, laboratory exercises, fieldwork and tutorials in the same course. This method stimulates the linkage between theoretical knowledge and practical application. In addition, the curriculum provides ample opportunities to the students to learn and practice presentation skills, to write and communicate about scientific issues for both specialists and non-specialists. The LU-ANAR graduates have been trained to conduct research independently as it was exemplified by different modules to train in literature search, writing and defending concept notes and research protocols, giving seminars and conducting independent thesis research. The latter phase encompasses a

full year of the two-year Master programme, which, all together, secures the academic level of the programme according to level 7 of the European Qualifications Framework

Yet, the societal challenges, especially on the African continent, and how students are trained to reflect on their role in relation to these challenges, are less clearly specified in the curriculum. Students should learn to work in multi-disciplinary teams, to reflect, judge and respond to societal needs and to critically reflect on and adjust when needed, their own behaviour *vis-à-vis* societal changes and needs. As these high-level skills involve ethical and social normative values, they require continuous training along the duration of the programme, in the same way as other academic skills such as communication, critical reflection etc., are being trained.

The inclusion of these aspects underlines the impression of the panel of experts that both the objectives of the programme and the desired qualifications of the graduates are mainly framed according to the technical and disciplinary knowledge required by the labour market with slightly less attention for attitude skills and a reflection on the societal role of graduates *vis-à-vis* significant global and regional societal challenges. Furthermore, the intended learning outcomes on programme level are rather unspecific.

Based on the above considerations, the panel of experts concludes that the Master study programme in Aquaculture needs to describe the intended learning outcomes (ILOs) at programme level in a more elaborate way than today, in order to specify the profile of the graduates by a more balanced description of the available knowledge, skills and attitudes with a clear identification of the various cognitive levels involved, also including interdisciplinary and societal needs [**Finding 1a**]. The programme management seems to use Bloom's Taxonomy for identifying learning goals of different course modules. The same taxonomy, provided that it is well applied, can also be used for elaborating and specifying the ILOs of the programme. For instance, the university could do this by using the Dublin Descriptors, which are a good tool in Europe used as a general guideline to construct the programmatic ILOs.

Curriculum and Programme Quality

The Master programme comprises one year of course work and one year of conducting a research project about which a thesis is produced and presented. This coincides well with a structured research master programme in Europe, and LUANAR should be lauded for this endeavour within the African context. In addition, the university applies an open and transparent study information system where all course modules are described, including the learning goals of each module, a content description, the modes of instruction with their respective contact hours, etcetera. The curriculum covers both subject-specific courses and cross-subject elements, often taught together with or exclusively by professors of other departments or even faculties. As mentioned earlier, the programme provides ample opportunities for students to learn and practice skills in communicating science, by oral presentations, writing scientific documents and papers and synthesising literature. All this is very commendable and appreciated by the panel of experts.

On closer scrutiny, some remarks have to be given. First, the structure of the programme is overwhelmingly compulsory (37,5 credits out of a total of 43) providing space for the students to select only two elective courses in the field of their desired specialisation. That may create a barrier to acquire the high level of specialised knowledge and original thinking in the specific field of work of a future employer who, when recruiting someone with a Master degree, expects to include a specialist in her/his staff, not a generalist. Several of the different mandatory course modules contain very related, or even seemingly overlapping contents. A fresh and frank look at the programme and the different course modules may easily free several credits of the compulsory programme in favour of the elective part. Students can enter the programme both in the first and in the second semester. This fact enforces the impression of the panel of experts that the programme is more a basket of different disciplines and independent course modules than a structured programme in which students are stepwise guided to higher levels of cognitive complexity and reflective thinking. However,

the fact that the thesis reports, which were available to the panel on-site, were considered of satisfactory academic level proofs that also the current programme structure is effective.

However, the panel of experts finds that there are other strong reasons why this programme structure should be revised. LUANAR explicitly mentions in the SER that the maximum amount of credits per semester should be 12, while the current first semester has 21 credits, and the second 16. Although students and lecturers consider this of no problem, since 21–22 credits seem to be the norm in the Bachelor phase, the panel would urge the programme management to reconsider this. By reducing the number of compulsory courses in favour of the number of electives, the programme would give students the possibility to specialise in their desired topic and to reduce the workload in the first semester to enable first-semester students to better integrate into their new learning environment and to digest and absorb knowledge more intensely [**Finding 2**].

When evaluating the quality of the experimental design and analysis of the thesis research and the content description of the statistical courses, the panel of experts felt that the level of statistical knowledge and its application in research could still be improved. The panel of experts believes that research output could be even more solid by shifting elements of the PhD course in statistics into the Master's course. In consequence, it is necessary that the admission criteria are sharpened in a way that students have more knowledge of maths and statistics when entering the programme. By doing so, the Department could build on an advanced statistical knowledge in the PhD course [**Finding 8**] (also see p. 19).

In general, the quality of a study programme is exemplified by the degree that its graduates avail over the academic qualifications needed by the labour market and comply with the intended learning outcomes of the programme. It must be clear that the learning outcomes on programme level are achieved by the combination of the course modules in the programme. The exam questions in each of these modules have to assess to which extent students can achieve the learning goals of the specific course in the framework of the learning outcomes on programme level. Neither the SER nor the site visit could shed sufficient clarity on this to the panel of experts. It, therefore, demands from the programme management and teachers to develop a matrix of programmatic learning outcomes and course modules whereby indicators clarify which course modules contribute to which learning outcome of the programme, or a comparable description how the learning outcomes are reached by the programme [**Finding 9**] (also see p. 24). This description has to be done after the ILOs were specified and the curriculum was revised by reducing the number of compulsory courses to focus on a specific set of competencies the graduates can demonstrate, as demanded above. By doing so, the programme managers can adapt the study programme easier to changes [**Finding 3**].

PhD programme

Intended Learning Outcomes

In addition to the Master programme, the Lilongwe University of Agriculture and Natural Resources also offers a PhD programme. Thus, the university offers an entire scientific career of the education of scientists with a doctorate via the Bachelor degree and the subsequent Master degree which ends with the highest academic degree in the university career. It offers doctoral students a research-based curriculum with individual supervision and various laboratory rotations within an interdisciplinary scientific environment. Students with a Master of Science (or similar qualifications) who are interested in a PhD can start a doctorate at the Bunda Campus and complete numerous university teaching and laboratory courses, and in this context pursue important scientific questions together with their supervisors and investigate them in research projects.

The admission procedures to enter the PhD programme guarantee a proper selection of candidates with a clear focus on academic research capacities; students have to submit and defend a concept note of the desired research project, and when accepted, need to develop this into a fully fledged

research proposal which is subject to peer review. The panel would encourage the programme to use its International Academic Advisory Board or even a list of international peers to comment and review these proposals before the student starts her/his research. All in all, there is a series of procedures in place to guarantee the academic level of the PhD graduates according to international standards.

The intended doctoral project is thematically linked to the completed Master programme. Thus, the PhD programme follows the Master programme described above consecutively and thus enables the scientifically minded Master students to deepen their education. In this context, it is important that the Master programme is corrected or supplemented, as already mentioned in the text above. Without the proposed improvements for the Aquaculture Master, there will be gaps in the PhD programme, and thus no coherent progressive structure will be achieved.

The course also attracts international PhD students to the university – provided that they meet the PhD requirements of LUANAR. Due to the international position of LUANAR, the establishment of the PhD programme can be seen as an extension of the university's position in the field of aquaculture and fisheries in East Africa and beyond. By being awarded the status of an African Centre of Excellence, the department has proved to be on a high level in the area.

The aim of the PhD is the education and promotion of young scientists. With a doctorate, the student demonstrates his or her ability to work independently and scientifically. This qualification is to be given in particular to those persons who, on the one hand, work on complex scientific questions and thus choose research as a career profile, and on the other hand, a PhD is also regarded as common proof of a solid specialist education, which is required as a prerequisite for a career as a university teacher. A combination of both professions is often the case. Thus, LUANAR offers a programme which at a general level complies with level 8 of the European Qualifications Framework.

Currently, the programme misses a more concrete explanation of the specific Learning Outcomes on programme level. The information given in the documentation (e.g. in the description of the curriculum) is not precise enough and does not include all relevant aspects such as the social dimension and interdisciplinary competences. The panel of experts pointed out that it recognizes the learning outcomes of the respective courses explained during the meetings on-site and accepts them. From the expert's point of view, it will be good for the programme to specify the university's claim on PhD students, the overall achievement, the target market for graduates and their impact on the society. Thus, the experts see the need to describe the ILOs of the PhD programme in a more elaborate way regarding the same demands which are given above for the Master programme **[Finding 1b]**.

Elements and Programme Quality

The curriculum continues the students' education of the Master programme and is complemented by courses related to fishing. Thus, for those students who have already completed their Master degree at LUANAR, a PhD training based on the Master is offered. Whether this applies to students who either come from other universities in Malawi or even from neighbouring countries must be decided individually. The curriculum composition is adequate for the intended learning outcomes for the discipline. All curriculum courses are taught by experts. Accordingly, Lilongwe University of Agriculture and Natural Resources has the human resources and experience to provide the education that will be required to conduct a conscientiously taught PhD training programme efficiently. However, as clearly stated by students, it would be beneficial for the PhD candidates to increase the number of elective courses to allow specialisation and as a result, reduce the number of core courses as well as the experts recommend to reduce the number of taught courses in general (see p.19).

The timeframe for the dissertation given by LUANAR, including taught courses and individual research of the PhD students, is elaborate and comprehensible. It includes milestones and thus can help the students to plan their research appropriately.

In the opinion of the panel of experts, the workload in the PhD course programme appears to be unbalanced within the framework of the proportion of courses and the proportion of actual (practical) research. At the international level, the focus in the training of doctoral students is on the development of working and research hypotheses, which are then scientifically examined and practically implemented in order to confirm or revise hypotheses based on the given results. This example does not necessarily have to apply to Malawi, but if a well-trained scientist is to emerge at the end of the PhD programme, a substantial part of the training must be in practical work, once in the laboratory (with as many different tools as possible) and still in the aquaculture facility (the farm) or a commercial enterprise.

Specifically for the PhD programme, the university has clearly defined criteria for awarding the doctoral diploma (on top of a successfully and publicly defended thesis dissertation), such as having at least one scientific paper accepted for publication in an internationally peer-reviewed (ISI) journal and a dissertation containing at least three (usually five) research chapters (one of which is to be accepted or published, see above). For the experts it remained unclear in which journals these must be published, and what status the manuscripts must have in the review process (first authorship or other author rankings). The students and teaching staff seemed to be well informed about the regulations regarding the demands, but these are not included in the documentation of the study programme such as in the description of the curriculum (a document which is comparable to a module handbook in which students can also find information on the paper to be published during their studies). Therefore, the experts recommend specifying the information given in the curriculum's description or a comparable document with official status [**Finding 4**]. Universities often find it difficult to define clear requirements in terms of the quality, quantity, authorship and status of manuscripts submitted in order for a doctoral thesis to be accepted. However, a rough statement would help the students to plan his/her practical experiments and to design them correctly from the beginning.

Conclusion

The criterion is partly fulfilled. The ILOs of both programmes are defined and available in a published form. However, the experts demand from the university to rewrite the ILOs for the Master and PhD programme more elaborately to specify the gained knowledge, skills, and attitudes. Those ILOs should include the different cognitive levels which are involved, as well as interdisciplinary and societal needs. Furthermore, the experts strongly advise to reduce the number of compulsory courses in the Master programme in favour of the number of electives to enable students to specialise in their desired topic. The quality of a study programme is ensured by the accomplishment of the Intended Learning Outcomes of the programme. To show this, the experts demand developing a matrix of programmatic learning outcomes and course modules including indicators which clarify which course modules contribute to which learning outcomes of the Master programme).

The university has clearly defined criteria for awarding the doctoral diploma. However, the experts recommend the university to include a rough description of the requirements for the publication of papers in the documentation of the PhD programme (e. g. in the curriculum's description) to make the demands of what students need to accomplish to be awarded with the doctorate degree publicly available.

2. Procedures for Quality Assurance [ESG 1.1, 1.7 & 1.9]

The programme is subject to the higher education institution's policy and associated procedures for quality assurance, including procedures for the design, approval, monitoring, and revision of the programmes.

A quality-oriented culture, focusing on continuous quality enhancement, is in place. This includes regular feedback mechanisms involving both internal and external stakeholders.

The strategy, policies, and procedures have a formal status and are made available in published form to all those concerned. They also include roles for students and other stakeholders.

Data is collected from relevant sources and stakeholders, analysed, and used for the effective management and continuous enhancement of the programme.

Lilongwe University of Agriculture and Natural Resources describes itself as being committed to ensuring that standards of all academic programmes are appropriate to the level of the named award and remain comparable to the standards of similar awards on offer elsewhere across the country and the SADC region. To realize this commitment, the university sees key aspects in ensuring that students are well supported in their learning through excellent teaching, programme reviews, well-structured assessment, appropriate resources, and guidance.

LUANAR points out that its University Quality Assurance (QA) Policy allows its faculties and supporting structures to review its current and prospective provision in a self-reflective and comprehensive way. As stated in the SER, this includes seeking the views of the academic staff involved, the students, and external examiners and moderators including practitioners who can provide a national perspective on academic standards and quality. The programmes under review are accredited by the National Council for Higher Education upon meeting specific national requirements.

At LUANAR, the Deputy Vice-Chancellor is responsible for the overall operation of quality assurance and enhancement procedures as well as for the preparation of the Annual Overview Report on the academic work of the University. The Director of Quality Assurance is responsible for the day to day operation of quality assurance and enhancement procedures, supported by the Assistant Registrar (Academic). The Dean of each faculty is responsible for the management and collation of faculty data, and for preparing an overview report on the faculty. The Heads of Department are responsible for the QA of the individual programmes housed in their departments.

All PhD, MSc and BSc programmes of LUANAR operate within the provisions of the University QA Policy. Aiming at ensuring that both programmes to be accredited are relevant and respond to stakeholders' demands, a needs assessment study was instituted. Both programmes are further required to undergo a review process within a cycle of two years (Master) or four years (PhD) and the review is supposed to engage stakeholders for input. It is explained in the SER that all courses are subject to student evaluation to provide feedback for improvements.

LUANAR delineates that the programmes emerged through consultations with regional universities and other institutions, with active involvement in the design and its subsequent implementation process. With the aim to ensure international relevance, the two programmes were developed through consultations with regional experts from universities, government, NGOs, and the private sector. The regional engagement process is supposed to enrich the programmes and enhance its quality and sustainability through collaboration. External examiners are involved in the review of examinations which is supposed to ensure the quality of the programme on the assessment level.

The faculty considers the analysis of data as an important activity to understand the profile of marks achieved in each unit and across the faculty as a whole, and compare these both against historical course data and against university trends. The senate takes an overview of course profiles and may identify matters for further discussion in the annual or periodic course review process.

Experts' evaluation

The University has a clear QA policy for both the Master and the PhD programme, responding to the requirements of the National Council of Higher Education, with a well-described tree of responsibilities along the different levels of the university hierarchy, from Deputy Vice-Chancellor down to the levels of lecturers and students. Responsibilities within each programme and for individual programme elements are clearly defined and available to students. The quality assurance system is clearly documented and comprehensive. It involves various instruments such as course evaluations by students and teachers, evaluations of exam results vertically (in time) and horizontally (between courses, departments and faculties), programme evaluations and evaluations of labour market needs.

Each semester, student evaluation of each course is sought via the completion of an online course evaluation sheet. Completion of this evaluation is entirely anonymous and includes questions regarding the topics addressed in the course, the quality of the course material and the quality of the teacher him/herself. The document also provides space for specific remarks. The students the experts were able to talk to during the site visit varied in their opinions to which extent response was given to the outcomes of these evaluations, but at least several individual cases in which the programme/lectures responded immediately were observed. The panel of experts was very content by the transparency and "open-minded character" of this course evaluation procedure, for which the university is commended.

The Programme Management explores labour market needs and seeks advice on the Master and PhD programmes by consulting a stakeholder forum, consisting of representatives of industry, NGOs, public services and governance institutes. Although this process is highly commendable, its effectiveness depends on the frequency of these consults. The panel learned that the employers' group has met only three times so far, mainly during the development of both programmes under review. To ensure a proper connection to the professional field, the panel of experts recommends to the University to convert the current stakeholder forum into an annually "Professional Field Committee" with both national and international (SADC region) industry leaders, NGO representatives, leaders of research and higher education institutes, etc. **[Finding 5]**. The aim of the aforesaid committee should be a discussion of the learning outcomes on programme level, the curriculum, and procedures on how to better connect academic theory and professional practice for both programmes. Therefore, the experts recommend that meetings with representatives should happen regularly to receive feedback on the adequateness of the curriculum according to their needs **[Finding 5a]**. These meetings should, among other things, focus on the employability of the Master and PhD graduates, because Malawi itself will not be able to offer enough jobs in the future for all of them. Including the industry and other stakeholder groups active in aquaculture and fisheries from different countries could help LUANAR to educate experts who are well trained for the upcoming resource needs **[Finding 5b]** (also see p.23). Also, the labour market view could help to get a regular insight into research needs from the industry and other possible employers like from civil service. The aim is to improve the situation insofar that successful PhD students can look to the future with confidence and without the fear of being unemployed. This confidence should be provided in general so that applicants can be quite sure that the degree will give them a benefit when it comes to employability.

Similarly, procedures to safeguard academic integrity should be in place. The university seemingly relies on the quality and integrity of its staff and the presence of its office for Student Welfare in cases complaints would be deemed necessary (see student support). Although this procedure may work in general terms, the panel of experts would suggest to the university to establish more specific procedures, starting with a clear and university-wide available Code of Conduct of Scientific Integrity. For thesis reports, using openly accessible software to detect academic fraud such as Turnitin should be implemented as a routine procedure before submitting.

A proper QA system also requires useful data to rely on. Currently, the university seems to rely strongly on a system of analysing the course marks. This is certainly not sufficient but fortunately, the university is in the course of implementing a “tracer study” which would provide data on career progression of graduates, alumni experiences, ratios of completion vs. non-completion of studies. It is expected that this study will provide the required database. In this context, the panel of experts suggests that this tracer study should be repeated regularly, e.g. bi-annually or at least once in four years (to cater for different cohorts of PhD students) [Finding 6].

Conclusion

The criterion is fulfilled. The university holds procedures for design, approval, monitoring, revision, and quality assurance in place. The university strategies and policies are available in published form to all those concerned. To set-up the M.Sc. and PhD programmes, data is collected from various sources including stakeholders. To guarantee continuous quality improvement of the programmes, the experts recommend regular meetings with external stakeholders to receive feedback on the adequateness of the curricula according to stakeholder needs. Furthermore, data for quality assurance is collected on course marks of different modules. However, the experts encourage the university to implement more elaborate tracer studies to rely on more sophisticated data.

3. Learning, Teaching and Assessment of Students [ESG 1.3]

The delivery of material encourages students to take an active role in the learning process. Students are assessed using accessible criteria, regulations, and procedures, which are made readily available to all participants and which are applied consistently. Assessment procedures are designed to measure the achievement of the intended learning outcomes. Additionally for PhD programmes:
The form of supervision and/or course structure is adequate and corresponds with the intended learning outcomes.

It is explained in the SER that both curricula are structured in a way that all courses consist of lectures, practical trainings (in laboratories or in the field) or tutorials, assignments, homework, and that they can also include field trips and/or individual research projects. Field trips to the industry, aquaculture farms and fisheries stations shall give students real-life experience. Each study programme shall also involve literature reviews through the seminar in which students should discover areas that need research. The teaching staff also tries to involve students in their research projects.

On the part of communication, the programmes offer courses such as a seminar in which students are involved in literature review and development of review papers on which they give oral presentations to the audience. Similarly, the students are exposed to research project writing as well as its presentation. The students are offered short courses in proposal writing and special assistance is given to those that have shortfalls in English.

The department explains in the SER that it works in collaboration with other regional, national and international institutions in teaching and research and has signed memoranda of understanding with most of them. National institutions include Department of Fisheries (Malawi Government), Mzuzu University, University of Malawi and MALDECO (a private company). Regional institutions include Catholic University of Mozambique, RUFORUM in Uganda, Rhodes University in South Africa and University of Eldoret in Kenya. International partners include Freshwater and Fisheries Research Centre in China, Kagoshima University in Japan, Pennsylvania State University in USA and University of Newfoundland in Canada.

Assessment

The Master programme is assessed using the grade point average (GPA) system with a pass mark of 60% (C+). Details of the GPA system are given in the LUANAR Post Graduate Handbook that each student receives upon registration and as well in the Academic Rules and Regulations (version of October 2016 adopted by the Senate). The student's course work shall be continuously assessed through assignments, quizzes, mid-semester exams, and end-of-semester exams. For postgraduate students, it is expected that questions that test knowledge or lower order levels should comprise about 30% of the examination while questions that encourage students to apply knowledge, evaluate, synthesize and create should make up about 70%. The weighting of the assessment tools depends on the significance of the subject matter, but the total of the continuous assessment is up to 60% while the rest is allocated to the end-of-semester exam, totalling 100%.

The department explains that it follows university-wide procedures in organizing and marking exams. The draft examination time-table is released half-way in the semester to allow for staff and students to comment. Academic members of staff are requested to develop examination papers for vetting a month before writing the examinations. Final exam papers are kept at the University Registrar's office. The responsible person is the Chief Examination Officer. Deferred examinations are written a week after the examination period to allow students who missed the exams with valid reasons to write them. After the examination period, academic members of staff are given a month to mark the exams. The results are assessed at departmental, faculty and senate level before their release. The academic staff then uploads approved results to an online system. Students have an online account where they register for courses and also see their examination results.

When preparing the individual research project, students have to submit a concept note to the Department. The office of the Head then aligns them to a member of the teaching staff who has a specialization or research project within the discipline that the students' concept note covers for supervision.

At the thesis stage, LUANAR subjects postgraduate research projects through internal and external examinations which are supposed to secure independence of the assessment as well as the adherence to the university's standards.

Experts' evaluation

Master Programme

The department offers blended courses, each of which uses a mix of different teaching methods, e.g. classroom lectures, lab and field exercises, tutorials, assignments, etc. Self-study and autonomous learning activities are stimulated via field trips or literature discussions. Perhaps as a consequence, students appeared to be highly motivated and generally eager to learn. The panel of experts appreciates this approach very much because it is a first and essential step to stimulate the learning process among the students.

Furthermore, from the first semester onwards, students are immersed in a scientific and academic training needed for their critical and original scientific thinking, by actively participating in research seminars, literature reviews, and "critical sessions" in which students can interact and comment on each other's projects. The university supports this academic atmosphere by providing good facilities, especially for online literature search of the major scientific journals; this is, without doubt, a surprising modern infrastructure for a university in a developing country. All this enforces the impression that students are stimulated to take an active role in their training process, a training which has a clear academic and scientific orientation to the broad field of aquaculture.

Yet, precisely the latter was somewhat contested by the interviewed labour market representatives. In spite of the many actions taken by the university to gear the curriculum and the teaching modes

to the needs of society, labour market representatives considered LUANAR graduates as “lacking hands-on experience” and “insufficiently capable to bridge theory to professional practice”, forcing them to provide (too) long in-house training upon employment, though it was not made fully clear if these impressions generally apply to the Master graduates or mainly to those with a Bachelor degree. The panel of experts is aware that this view may also be biased by the (small) selection of interviewed stakeholders, but the message is clear and challenges the university to cater for more intense hands-on experience practices while maintaining the academic level of the study programme. Thus, the panel of experts encourages the programme management to consider the introduction of “project-oriented” and/or “problem-driven” teaching methods/courses, and/or specifically targeted courses which prepare for professional life, including topics such as project planning and design, group works in which students work on real-life cases issued by stakeholders or anything similar [**Finding 7**]. Another approach which could contribute to this goal is by providing the (expanded list of) elective courses in packages of interconnected courses which would provide students a sort of “minor” specialization in the direction of their target employment field [**Finding 2**] (also see p. 9).

The programme has two starting points: students can enter either in the first or the second semester, depending on the time of the year they start their studies. This system is particularly created to facilitate admission of international students from other African countries, who often face long visa and/or funding procedures. However, students entering in the second semester may lack some pre-knowledge provided by first semester courses. Both students and teachers agreed that this could complicate the learning process of these students, but did not consider it as a major barrier. The programme also provides some remedial courses, e.g. for English proficiency and alike. Yet, the panel of experts would suggest helping these students by providing online course material of first semester courses and/or by sharpening the entrance requirements (e.g. for English proficiency, and for mathematics/statistics as stated above).

Assessment procedures are very strongly organized in the university and exams are subjected to internal checks and standards. These procedures are transparent and available to teachers and students. There is a guideline what is expected of the students in the examinations. Thus, the experts are convinced that the assessment types used in the programme are suitable to give the students the possibility to show that they have gained the knowledge and skills the course envisages.

During the semester, there are examinations, and there is an end-of-semester exam. After each practical, students write a report about the methodology used, and this is graded. The programme also provides an appeal procedure: within a two-week window, the students can ask for an explanation of the grades and the assessment can be discussed with the teaching staff. These regulations can be found in the postgraduate student handbook, which is a university-wide used and published document on rules and regulations.

The university has procedures in place to cater for (justified) absences. If someone is sick, the student can get a note by the university’s hospital which states that the person cannot take part in the exam, so the student can re-sit the exam at another time and does not have to do the course again. If a person fails in an exam, the whole course has to be repeated including all classwork, assessments etc. (in the next year, because courses are given only once per year).

Exam results (marks) are stored in a university repository and used for comparison with the marks of the same course in earlier years (vertical comparison in time) and/or benchmarked with marks from all other courses in the department/faculty, or even university-wide. It was not clear to the panel how the outcome of this analysis was used in the overall QA procedures of the university regarding assessments. For the future, this should be included in the documentation of the QA system of LUANAR and information on this given to experts.

PhD programme

As already mentioned in the assessment of the Master programme, the department offers a wide range of courses, learning methods and other forms of learning, which also applies to the PhD programme. Rules and regulations for the PhD programme are included in the postgraduate student handbook, and thus are laid down transparently and are publicly available. These include regulations on the writing and submission of a dissertation thesis as well as on the many other aspects that are relevant such as application and admission procedure, structure of studies, supervision and progress reports, or guidelines for examination and coursework as well as ethical considerations, e.g. on the prevention of plagiarism, on academic honesty, or the LUANAR Research Ethics Committee (also see p. 12).

The experts are convinced that PhD students are provided with a proper scientific environment at the level of doctoral education. The suggestion to establish a research campus has already been mentioned below (see p.28). This would bring the character of an internationally recognised fisheries and aquaculture university, which would give the students (including international students) the certainty of enjoying the best education. Moreover, social contacts would also be created on such a campus, which would allow networks to develop, guarantee support in education (tutorials, learning groups), and be highly conducive to engendering the right kind of academic and research environment.

Conclusion

The criterion is fulfilled. Students are assessed using accessible criteria, regulations, and procedures, which are made readily available to all participants and which are applied consistently. The accomplishment of the ILOs is measured by course-specific assessments. However, the panel of experts encourages the Master programme management to imply “project-oriented” and/or “problem-driven” teaching methods/courses to prepare students for professional life on a higher level.

4. Student Admission, Progression, Recognition, and Certification / Legal status, admission and certification [ESG 1.4]

Consistently applied, pre-defined, and published regulations are in place which cover student admission, progression, recognition, and certification.

Additionally for PhD programmes:

The institution is entitled to award a doctorate.

Admittance to the study programmes

To apply for the Master programme, applicants need to have a Bachelor of Science degree in Aquaculture, Fisheries Science, Animal/Veterinary Science or other relevant biological sciences with at least a Credit pass. Those with a relevant Bachelor degree with a mere pass but long working experience may also be considered. Candidates may be enrolled on condition that they take pre-requisite courses before or during their studies.

Candidates with a relevant and quality Master degree can apply for the PhD programme. Applicants, where necessary, can be required to take oral and/or written examinations in their major and minor fields to determine overall preparation and background. Students will take an examination before advancing to PhD-candidacy (starting their research). The examination serves as a guidance examination, the results of which are used in deciding as to whether the candidate is suitable for the continuation of the programme or not. Students may be enrolled for a “split” PhD programme, where necessary and feasible, if it is essential for research students to spend the data collection phase or the taught courses phase with institutions that have an agreement with LUANAR. This can be accommodated within the University of Malawi regulations as long as a minimum of a full academic year is

spent at Bunda College. Students can be admitted to both programmes in April and September each year. LUANAR offers admittance for fifteen Master students and ten PhD students each semester to the programmes under review. The average number of students is listed as five enrolments for the Master programme and three enrolments for the PhD programme per year. Candidates from non-English speaking countries shall be admitted upon confirmation of their proficiency in English language. If their English proficiency is not sufficient, attending language courses at the Department of Agricultural Education and Development Communication is recommended.

The Department in liaison with the regional selection committee considers the eligibility of the applicant for the programme and, where necessary, if formal interviews shall be undertaken. The Department forwards its recommendations to the Dean of Faculty who informs the Dean of Postgraduate Studies and the Registrar accordingly. The decision on admission is made by the University Selection Committee which reviews the recommendations from the Postgraduate Studies Committee and recommends them to the Senate for approval. The Dean of Postgraduate Studies through the Postgraduate Committee will inform the Dean of Faculty and the Registrar of the acceptance or rejection of the application. Upon acceptance, the Registrar shall inform the candidate in writing and copies of the letter of admission are forwarded to the Department, Dean of Faculty and the Dean of Postgraduate Studies and Research. Where scholarships are available under RUFORUM, these will be awarded by a Regional Academic Board.

The application requirements and procedures as well as regulations on enrolment are explained in detail in the Postgraduate Student Handbook as well as in the Academic Rules and Regulations.

LUANAR states that it welcomes enquiries from prospective students with specific learning difficulties such as dyslexia, sensory impairments, mobility difficulties, medical conditions or mental health concerns who are to be supported by the Network and Services Section.

Progression

The planned structure of both programmes is described in chapter 4 “Quality of the curricula”. Information and regulations on registration and renewal of registration as well as the structure of studies offered by LUANAR, supervision and progress reports etc. are published in the Postgraduate Student Handbook.

Creditation and Recognition

The curriculum is developed based on a ‘credit-unit system’, where credit hours are assigned to each course a student pursues. The normal maximum load for a full-time graduate student shall be 12 credit hours per semester, which consists of 15 teaching weeks. With approval of the Postgraduate Office, a student may exceed the credit hour limit. A credit hour is equivalent to one hour of lectures or two hours of practical training. Doctoral students are required to complete 33 credit hours of coursework while Masters’ students are expected to finish 43 credit hours of coursework.

Mobility and recognition are described as being possible, e.g. if students choose a “split” PhD programme.

Certification

The degrees that are awarded are Doctor of Philosophy in Aquaculture and Fisheries Science and Master of Science in Aquaculture. Graduates receive a degree certificate and a transcript on request.

Experts’ evaluation

Based on the evidence seen during the site visit, the expert panel concludes that the admission criteria for both Master and PhD students are in place and transparently outlined. Master and PhD students need to have a Bachelor or Master degree in a similar discipline to be accepted for the respective programme. By including relevant Bachelor or Master degrees in the admission criteria, the Department secures that students have a substantial level of knowledge to start the Master or PhD programme. For both programmes, the decision of admission is based on their GPA.

Additionally, students need to demonstrate sufficient language skills in English to enter one of the programmes. Since the Centre of Excellence attracts students from different non-English speaking countries (e.g. Mozambique or Burundi), this is very helpful in the selection process.

The experts acknowledge the wide variety of scholarships available to support students financially. The Department also helps PhD students in terms of the application for grants by suggesting and supporting the writing of research proposals. Nonetheless, it would be desirable to intensify the department's efforts to show potential ways of funding.

Overall, admission to the study programmes is awarded according to defined entry requirements and procedures are publicly available on their website. In general, the experts conclude that the requirements are well defined and well-intended to ensure that the students can successfully complete their studies. However, the experts emphasise the importance of statistics for both programmes, as outlined above. Especially in terms of data analysis, a basic knowledge of statistics is required to analyse acquired data correctly. By increasing the level of knowledge of statistics in the admission criteria, the Department would strengthen the scientific basis to conduct research. Therefore, the Department must increase the mathematical and statistical knowledge within the admission criteria for Master students. This will be in consequence beneficial for the PhD programme as well [Finding 8] (also see p. 9).

The Master programme is launched twice a year in April and September. Thus, admitted students start the programme with the curriculum of the first semester or second semester according to their time of admission. The lecturers of the programme clarified that courses are not planned in a bottom-up manner so that students can start different courses at different time points of their curriculum. Due to the broad background of the students, the experts derived at first that some general lectures in the beginning to level-up students to a comparable level are needed, but based on the discussion rounds and the evidence given during the site visit this is not an acute issue. However, it is desirable that the Department contemplates on methods to help students in case their prior state of knowledge is not sufficient to complete the modules satisfactorily (also see p. 16).

Being a state university, Lilongwe University of Agriculture and Natural Resources is legally entitled to award doctorates and the necessary policies and procedures are in place to govern the award of the doctoral degree. Students have legal status at the Department with all effects implied. Students that have completed the Master or PhD programme receive a degree explaining the nature of the study programme. Master students additionally receive a transcript outlining information about the programme, level of qualification and the performance of the student in particular. The panel of experts testifies that these documents are fit for purpose and demonstrate transparency regarding the respective degrees awarded.

Conclusion

The criterion is partly fulfilled. Overall, consistently applied, pre-defined, and published regulations are in place which cover student admission, progression, recognition, and certification. However, the Department must increase the mathematical and statistical knowledge within the admission criteria for Master students to secure an adequate level of knowledge and skills in order to substantially broaden and deepen them in the course of studies. The experts presume that this would also have a beneficial impact on the Ph.D. programme since this mathematical and statistical knowledge then can be assumed for admission.

5. Teaching Staff/Academic level of supervisory staff [ESG 1.5]

The composition (quantity, qualifications, professional and international experience, etc.) of the staff is appropriate for the achievement of the intended learning outcomes.

Staff involved with teaching is qualified and competent to do so.

Transparent procedures are in place for the recruitment and development of staff.

For the Master programme the university lists 13 members of the department involved with a specialization in the following areas: Fisheries Science, Fisheries Ecology, Fish Nutrition, Aquaculture Production Systems, Fish Genetics, Ichthyology, Fisheries Science, Limnology/Wetland Ecosystems, Genetics and Molecular Ecology, Aquaculture Systems and Engineering, and Fish Biology. Ten members of the teaching staff have a permanent full-time position of which three are professors, four associate professor, two senior lecturers and one lecturer. The Department of Aquaculture and Fisheries Science has twelve established positions in total. Eight of the academic members have doctoral degrees while two are pursuing their doctoral studies. If a position needs to be filled, there is a recruitment plan.

For the PhD programme six members of the teaching staff are listed who cover the following areas: Fisheries & Wildlife; Fish Ecology; Fish Nutrition, Fisheries Ecology, Aquaculture Production Systems, and Fish Genetics. Additionally, teaching staff from other departments is involved covering the areas Microeconomics, Econometrics, Research Methods, Natural Resources and Environmental Economics, Marketing, Animal Health, Animal Nutrition, Biochemistry, Animal Breeding, Breeding/Genetics, Aquaculture, Fish Biology, Fisheries, Fisheries Ecology, Stock Assessment, and Fisheries Economics.

The PhD programme has two courses that are imported from the Faculty of Development Studies: "Life Skills and Personal Development" and "Advanced Resource Economics and Management". The Master programme also has two courses imported from two other faculties: "Biochemistry" from the Faculty of Agriculture and "Environmental and Natural Resource Economics" from the Faculty of Natural Resources.

In addition, members of the following partner universities are involved: Makerere University (Uganda), Moi University (Kenia), University of Western Cape (South Africa), Memorial University of Newfoundland (Canada), Rhodes University (USA), University of Rhode Island (USA), University of Namibia (Namibia), Danish Bilharziasis Laboratory (Denmark), and KwaZulu Natal (South Africa) in the areas of Fisheries Science, Aquaculture, Fish Parasitology, Biostatistics/Biometry, personal mastery and participatory approaches, and gender.

The policy of staff development and qualification is supposed to encourage staff to pursue their education up to doctoral level and to undergo retooling courses from time to time. Lecturers are described as being trained to use experiential learning in their teaching. Retooling courses should be available in every academic year to assist lecturers to improve course delivery. Lecturers are to be familiarized with ICT tools like the Moodle platform and Google classrooms. New academic members of staff undergo orientation in course delivery skills, proposal writing and similar courses. Leadership training is offered to those who are occupying a position like Head or Deputy Head of Department.

Experts' evaluation

The Department of Aquaculture and Fisheries Science has currently established ten academic staff positions, which are under a permanent contract. Eight of these academic staff members are PhD holders with PhDs acquired at international higher education institutions. The other staff members are currently undergoing their PhD fellowship. Substantiating this fact, the experts testify that the Department involves teaching staff in the programmes that has adequate academic qualifications and that allows them to carry out the programmes properly. Additionally, the background of the academics allows the Department to provide a comparable picture of the discipline (the European, American or Asian perspective towards the discipline) to a certain amount. Thus, the teaching staff

is qualified for the achievement of all intended learning outcomes. The documentation available outlines in an adequate manner all persons involved in the programme and explains teaching hours and the overall workload. Also, it has been stated that some modules are imported from other Departments (e.g. the Faculty of Development Studies, the Faculty of Agriculture or the Faculty of Natural Resources). Based on the discussion rounds during the site visit, the experts learnt that the Department is fully aware that didactical methods could be fostered within the teaching staff. The Department members explained that it is planned to carry out a didactical workshop in 2020. In addition to this, a committee for teacher and learning skills is in place to enhance the quality of the teaching. In the past, the participation in courses established by this committee for teachers has not been mandatory, but the University will make it mandatory in the future. Leadership training is also one of the aspects that the University has established that testifies the well thought out instruments of LUANAR in terms of teaching enhancement.

In general, LUANAR has a certain amount of teaching staff who will retire in the nearer future. To counteract, the University has installed a recruitment plan which allows itself to provide on one hand follow-up contracts for those to be retired and on the other hand to find adequate staff to replace them. Overall, it can be outlined that the University and the Department have a well-established concept for staff development in place which covers steps for the academic, didactical and succession of teaching staff.

Conclusion

The criterion is fulfilled. Staff involved with teaching for both programmes is qualified and appropriate for the achievement of the intended learning outcomes.

6. Learning Resources and Student Support/Support and research environment [ESG 1.6]

Appropriate facilities and resources are available for learning and teaching/research (for PhD) activities.

Guidance and support are available for students which include advice on achieving a successful completion of their studies.

Facilities and resources

In terms of financial resources, the departments normally get part of the Malawi Government subvention from the university office which supports teaching and learning. Besides such subvention, the department gets 30% of the tuition paid by postgraduate students, but also allocates funds from the Aquaculture Farm. As stated in the SER, students are also given money for research according to their budget and scholarship.

According to the documentation, the facilities available for the programmes include a solar-powered hatchery, fish ponds, wet and dry laboratories, classrooms, office space, a computer room, a dark room, teaching/research equipment, transport, a library including books, journals and e-resources (e.g. TEEAL, HINARI, AGORA, AJOL) and internet facilities, etc.

The major research activities that have been carried out at Bunda College in Aquaculture and Fisheries Science listed in the SER include biological areas such as stock assessment, fish nutrition, limnology, integrated agriculture/aquaculture, riverine fishery management, biodiversity, water quality management and fish health and diseases. Also, some socio-economic research has been carried out in both aquaculture and capture fisheries. These have been conducted by staff as individuals or collaboratively, and referring to the university also through supervision of both Bachelor and Master students. Additionally, Malawi was selected to lead the regional New Partnership for Africa's Development (NEPAD) initiative by the Southern African Network on Biosciences (SANBIO) in coordinating

a Fish Biodiversity Project through the Bunda College. Bunda College is also working with a local commercial fish farming company on research to develop tilapia feeds for cage culture.

Tuition fees are \$ 2,700/year for the Master programme and \$ 4,000/year for the PhD programme. Financial support of the students is granted on different levels and by different organisations. For example, RUFORUM has a Graduate Teaching Assistantship programme by which PhD students can get tuition waiver whilst the sending institution supports the student's upkeep; this programme is also tested for Master students. The department receives six DAAD in-region and in-country scholarships per year. AquaFish ACE by its design is supposed to recruit at least 20% from the region as a disbursement linked indicator.

Module Descriptions

Descriptions of the courses of each programme can be found in a handbook on both programmes including a syllabus which includes information on teaching hours (lectures and practical trainings), methods of assessment, aims of the study, learning outcomes, topics of study, prescribed texts and recommended readings. According to the SER, the course outlines are updated every semester when they are offered by the respective lecturers. The course handbook (i.e. the curriculum) is revised based on the cycle for the particular programme, thus once every two years for the Master programme and once every four years for the PhD programme.

Information, Consultation and Guidance

The main source of information for candidates and students is the Postgraduate Student Handbook which includes details on application and admission, structure of studies, supervision and progress reports, guidelines for examination of coursework, seminars and conferences, payment of fees, postgraduate assistantship, students' welfare and ethical considerations (such as a code of conduct) as well as an annex with forms and information on the thesis format. These aspects are also defined in the Academic Rules and Regulations of LUANAR.

The programmes are coordinated by the department. The Deputy Head of Department is the coordinator who belongs to the university's Postgraduate Committee, headed by the Dean of Postgraduate Studies. The Postgraduate (PG) Coordinator together with the Dean of Postgraduate Studies offers guidance-counselling services to students with support by the Head of Department. Also, a Supervisory Committee with two members for a Master programme and a maximum of three members for a PhD programme is installed for every student. The major supervisor (chairperson of the supervisory committee) shall be responsible for ensuring a high level of scholarship exhibited in the research work and thesis of the student. The progress of the research shall be continuously monitored and evaluated during regular meetings with the major supervisor in order that the research is completed on time. It is the responsibility of the Supervisory Committee to ascertain that the thesis of the candidate is written in English (UK), and in an appropriate scholarly style prior to submission to the examiners (internal and external). Prior to the defense of the thesis, each member of the Supervisory Committee shall have to certify that he or she found it acceptable in scope and quality. The tasks and requirements of the supervisors are documented in the Postgraduate Student Handbook. When allocating supervisors to students, the PG coordinator shall ensure that all members of the teaching staff have students to supervise, either as major depending on area of specialization and research interests, or co-supervisor.

There are also two more offices which are involved in students' guidance and counselling: the Director of Students Affairs and the Assistant Registrar Students Welfare. Also, it is planned to establish an "international office" that shall concentrate on guidance-counselling services, especially for students from other countries. Subject-specific guidance is supposed to be given by the lecturers during office hours for consultation or by using internet media.

During application for admission, students are requested to indicate if they need special requirements. As stated in the SER, LUANAR tries to facilitate the beginning of the studies at Bunda

College, e.g. by helping in applying for visas for international students and prioritizing these students during allocation of accommodation, and also by giving a house to female students with children (and a single room to other postgraduate students). Thereafter, all new postgraduate students undergo a week-long orientation programme to become familiar with the campus, staff and fellow students. Those with special needs shall be assisted accordingly. Those coming from non-English speaking countries are given language support courses, if needed. Those who are deficient in some areas are given bridging courses. All routes on campus are equipped with ramps.

Experts' evaluation

The panel of experts confirms that adequate learning resources are available to carry out the programmes and research appropriately. Students have access to the library at Bunda Campus. The library provides literature in aquaculture and fisheries science-related topics. The experts testify that the literature and journals provided are adequate in amount, relevance and topicality. The learning resources cover laboratories, working rooms and experimental farms. These facilities were state-of-the-art at the time of their construction and are still fit for purpose. A real benefit for the students is that especially the experimental farm is currently underutilised, which means that there is no waiting time required for students, and they can access these facilities at any time.

Conversely, the panel of experts believes that by underutilising this valuable asset, it could be desirable for LUANAR and the Department to utilise it to a greater extent for revenue generation in service of business's needs. The panel of experts sees potential to solicit paid-for research for unsolved issues with which the commercial farmers struggle (e.g. tilapia feeds for cage culture). By doing so, the panel believes that the connection between the labour market and the Department can be strengthened and the practical-oriented issues can be solved. Furthermore, the University has a unique veritable natural laboratory for academic study of many aspects of aquatic life and biodiversity. Proximity to this asset can only be beneficial for the University since the majority of the research output has been conducted under the auspices of European or American universities. In conclusion, the panel of experts suggests focusing even more on practical-oriented issues from local farmers and the private sector in neighbouring countries in addition to the current research topics [**Finding 5b**].

Financial provisions are in place and adequate to support the programmes. The experts were impressed by the standard of study materials, information access and facilitation available to students. The supervisor-to-student ratio at present is highly favourable, although this is likely to change if the University succeeds in attracting a greater number of graduate students in the future. In practice, PhD students avail often an office on campus for their own use.

For the Master programme course descriptions are available to students in form of brief descriptions of learning outcomes on module level. Being generally a helpful document for students to inform themselves beforehand about the workload, the intended learning outcomes on course level and the assessment methods, this clearly needs to be improved [**Finding 9**]. Naturally, the module handbook has to be in line with the overall intended learning outcomes on programme level [**Finding 1a**] (also see p. 8). By using, for instance, a matrix that shows how the intended learning outcomes on programme level are taught on course level, the Department will be able to elaborate the learning outcome on course level easier [**Finding 9a**]. Furthermore, the course descriptions must be seen as a helpful instrument for students to anticipate the content of the course, but also the assessment method used for the specific course. This has to be outlined in the course descriptions accordingly. The available description of the curriculum, which included course descriptions, did not give details how each of the components in each course module would be assessed, or what the relative weight of the different sub assessments (e.g. practicals, tutorials and lectures) was. The panel of experts calls to add this information to the course module descriptions to create a higher level of transparency compared to the information that is already given [**Finding 9 b**].

The supervision for PhD students is appropriate in a way that good supervision procedures for students are in place. Once PhD students are accepted to the programme, the supervision committee appoints a supervision team to the PhD student. The team comprises of a major supervisor and a co-supervisor. Both have different responsibilities, such as the responsibility to ensure the level of the research work and the theses (supervisor). The progress is continuously monitored by regular meetings of the PhD student and the supervisor. The co-supervisor has the duty to provide feedback on the written work of the PhD student and keeping track of this work. These areas of responsibility are clearly outlined in the student handbook. Additionally, students are required to hand in a student's progression report four times a year to allow the supervision teaching staff to identify potential risks for the thesis work. In return, the supervisor has to produce a supervisor report regarding the progression of the student, the anticipated completion date and activities the PhD student has done since the last report. These activities might cover, for instance, oral presentations to an adequate audience. This supervisor report has to be submitted to the supervision committee twice a year. The panel of experts concludes that the procedures and mechanisms in place for the PhD programme are of a high standard and completely satisfactory.

Quality assurance and student services support guarding against intolerance, discrimination and other forms of harassment. LUANAR has an office for Students Affairs, including a registrar for Student Welfare, where students find a safe and reliable counter for addressing complaints or possible problems regarding the above-mentioned issues. When asked for, students confirmed that this system was reliable and provided confidence.

The panel of experts wishes that the application process of prospective PhD students be improved in order to make financial support accessible more easily. So far, the students apply with a project idea with an accompanying scholarship to a professor of Lilongwe University of Agriculture and Natural Resources. The search for possible financial support as well as the right selection of scholarships can overextend a candidate – especially from abroad. The professors must act as contact persons and provide support. This applies in particular to the duration of the application review. There may be good and meaningful research ideas, but they are difficult to implement if there is no financial support. This often involves long waiting times in order to obtain a scholarship, which can finally even fail. In this case, more certainty must be offered to the applicants. Thus, from the expert point of view, it would be desirable to find a way to circumvent this strong connection to scholarships.

Based on the presented evidence during the site visit, the panel of experts can also testify that the research environment facilitates research activities of students and fosters the qualifications appropriately.

At the moment, there are no specific requirements for the PhD students for attending scientific conferences which is regrettable but because of the financial consequences also understood by the panel of experts. Interdisciplinary and international interaction between PhD students within the University and beyond can only be seen as an additional plus to the programmes [**Finding 10**]. Therefore, the panel suggests to establish an annual LUANAR Science Day during which its PhD students can present and discuss their results to further stimulate their academic maturity and the interdisciplinary exchange within the faculty and/or university [**Finding 10a**]. International exchange could also be beneficial for the PhD programme. “Sandwich programmes” with other universities are one way to establish a constant international exchange of students (and teaching staff). The Department should consider working on the idea of establishing these programmes [**Finding 10b**]. This would provide PhD students with a research environment in which they could achieve additional skills, improve their presentation competencies and build networks through international contacts. The whole development could take on the character of a research campus, especially if also a PostDoc programme could be initiated (which in turn would support the Master programme as well) [**Finding 11**].

Conclusion

The criterion is partly fulfilled for the Master programme and fulfilled for the PhD programme. Appropriate facilities and resources are available for learning and teaching/research (for PhD) activities. Guidance and support are available for students which include advice on achieving a successful completion of their studies. The panel of experts suggests focusing more on practical-oriented issues from local farmers and the private sector in neighbouring countries. The documentation of the Intended Learning Outcomes on course level and the assessment methods needs to be improved to guide students. Interdisciplinary and international exchange possibilities for PhD students should be improved.

7. Public Information [ESG 1.8]

Impartial and objective, up-to-date information regarding the programme and its qualifications is published regularly. This published information is appropriate for and available to relevant stakeholders.

As already described above, the main source of information for students on requirements and regulations is supposed to be the Postgraduate Handbook, the curriculum and syllabi as well; more information on the individual study programme can be found in the curriculum description.

According to the SER, tracer studies of graduates started in 2018. These studies are supposed to collect information on the courses of study and the study conditions at LUANAR, the graduates' transition after leaving the university, their employment situation and relationship between study and work as well as their individual background and mobility. Beforehand, information on the labour market was to be collected by a graduates' survey, in which the fields the graduates are employed in are looked at, as well as an employer survey, which assesses if the programmes meet the needs of the labour market.

According to the SER, there is an analysis of the completion and non-completion rates which the Faculty of Postgraduate Studies releases annually.

Experts' evaluation

The information provided to the public covers all necessary information. Based on the feedback during the site visit, the experts conclude that the programmes are acknowledged in the region and beyond. The regionally diverse student cohorts can testify this.

The Department informs online about the Centre of Excellence, about the programmes and publications made by staff or students. Admission requirements and the selection procedures outlined help prospective students to inform themselves about the Master and PhD programme. In addition to this, the Department gives valuable insights regarding key partners and collaborative partners. The panel of experts concludes that the advertisement and promotion of the programmes are in place and well established. Despite all that, the experts believe that on-going projects and research foci are sure of interest for the public. By outlining, this information, the Department could increase the attractiveness for future collaborators and increase its visibility [**Finding 12**].

Conclusion

The criterion is fulfilled. Impartial and objective, up-to-date information regarding the programmes and their qualifications are published regularly. This published information is appropriate for and available to relevant stakeholders, besides a more elaborate description of the ILOs which needs to be specified for both programmes. The panel recommends that on-going projects and research foci should be publicly available to increase the programmes' visibility.

V. Recommendations of the panel of experts

The panel of experts recommends to **accredit** the study programme “**Aquaculture**” (Master of Science) offered by **Lilongwe University of Agriculture and Natural Resources (Malawi) with conditions**.

The panel of experts recommends to **accredit** the PhD programme “**Aquaculture and Fisheries Science**” (PhD) offered by **Lilongwe University of Agriculture and Natural Resources (Malawi) with conditions**.

Findings:

Both programmes:

1. The Intended Learning Outcomes on programme level have to be described in a more elaborate way to specify the profile of the graduates by also including interdisciplinary and societal needs. This has to be done separately for the Master programme (1a) and the PhD programme (1b).

Master programme:

2. To give students the possibility of specialisation, a reduction of compulsory courses in favour of electives should be considered.
3. Based on the outcome of the analysis of which courses are essential to achieve the learning outcomes on programme level, it has to be shown how the overall learning outcomes are achieved by the combination of modules, e.g. by using a matrix.

PhD programme:

4. The authorship criteria for scientific papers of PhD students should be given in an official document, e. g. the curriculum description.

Both programmes:

5. The interaction with the regional and local labour market should be strengthened. A special focus shall be put on the following:
 - c. Stakeholder meetings with labour market representatives should happen on a more regular basis to detect their needs.
 - d. The interaction with the labour market should be used in a way that a stronger focus is laid on practical-oriented issues from local farmers and the private sector in Malawi and their neighbouring countries.
6. The panel of experts suggests implementing a “tracer study” to be able to provide data on progression of students.

Master programme:

7. To enhance the link between theory and practice in the courses, students should get more possibilities to apply theoretical knowledge in hands-on experience, e.g. in project planning, design, and conducting, case studies, or the like.
8. The admission criteria have to be sharpened to guarantee that students have sufficient knowledge in Maths and Statistics.
9. The module descriptions have to be revised, focusing on the following aspects:
 - c. The intended learning outcomes have to be described in a more elaborate way.

- d. The type of examination(s) used must be clarified.

PhD programme:

10. In order to strengthen the exchange of PhD students of the programme, the Department should consider the following steps:
 - c. Interdisciplinarity should be fostered by establishing an annual Science Day or a comparable event which could even be organised for PhD students of different departments and faculties of LUANAR.
 - d. The Department should raise its efforts to internationalize the programme, e.g. by implementing “sandwich programmes”.
11. To enhance the visibility of the programme internationally, the potential of establishing a research campus by installing post doc programmes should be discussed.
12. Current research foci and on-going research projects should be published on the website. This might increase the visibility of the programme.