Evaluation report

Evaluated point	Grade	Comments
Scientific impact of research	Good	The Estonian University of Life Sciences (EMU) originates from the Estonian Academy of Agriculture founded in 1951 and became the first Estonian Agricultural University before it was named as it is now after merging with other entities. EMU is distinct among Estonian universities with a focus on the sustainable development of natural resources. It has an international reputation and is in the world top 100 for Agriculture and Forestry, and is in the top 1% of cited research facilities in the world in plant and animal science, and in environment and ecology. EMU comprises several research centres and field stations, and has three biological collections in zoology, botany and mycology. As far as natural sciences are concerned, research in this university, as well as teaching, is essentially application-oriented in relation to sustainable development of natural resources, bio-economy agriculture and forestry among other topics. Research in fundamental disciplines is primarily based on chemistry, biology and hydrogeology. Excellence is achieved in the department of plant physiology in which experimental and modelling approaches are used to analyse stress effects on plants at different scales by different factors and in particular by climate change. This has led to more than 15 published papers per year and strong international recognition. Other highlights concern the study of ecosystems of shallow lakes: climate change impacts and carbon cycling among other questions. The centre of limnology has a large data base and close connections with other collaborating groups, especially in Finland. Other platforms concern atmosphere— biosphere exchanges, in particular with the new station SMEAR in Estonia, in which the EMU is particularly involved. Other departments certainly deserve to be mentioned as well. It should also be emphasised that the natural science research of this university is of great complementarity to that in other universities, due to the EMU's specific mission.
Sustainability and potential of research	Good	There are clear areas of important research of international status although this is unevenly distributed, and there are a low number of internationally recognised experts. Sustainability of much research depends on the obtaining of personal research grants from government, EU or other sources. The appointment of several new Chair positions in 2017 and a new focussed strategy may enhance research opportunities and encourage new collaborations and initiatives. Sustainability of research has been enhanced by significant investment in buildings and reconstruction, and scientific equipment. The Science Centre of Renewable Resources has reconciled several structural units into a single building, which will encourage new collaborations. The EMU has very good infrastructure and

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		a portfolio of good research. The sustainability and potential of research of EMU in its entirety is obvious. Sustainability is also obvious for highlight areas in natural sciences. Some research groups in natural science seem to lack critical mass and should be encouraged to collaborate with groups with similar activities (if possible) inside and outside Estonia. For example, theoretical help in modelling, simulation, statistics, image processing, electronics, coding, etc., can normally be more easily obtained in a "classical" school. As in other universities, the researchers were confronted with many changes in the organization of the University of Life Sciences and the funding of research during the last few years. They have proved to have a remarkable capacity of adaptation. However, it is clear that more stability would be very profitable.
Societal importance of research	Very good	EMU graduates a high number of PhD students trained in diverse and important areas of life and environmental sciences. All areas of research in natural science of EMU are of societal interest and importance. The Centre for Limnology carries out research related to water protection and management, and has provided new scientific understanding of nutrient cycling in lake ecosystems that are of generic importance. Research carried out on plant stress responses, humidity effects on forest growth, atmospheric chemistry and other areas are relevant to understanding the potential effects of climate change. Other research, supported by various research stations and field bases, is relevant to plant and animal productivity. The biological collections provide an important resource for historical and modern studies of biodiversity and systematics.

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Scientific basis in the field is sufficient to conduct doctoral studies. (This question should be answered only if: a) institution being evaluated is conducting doctoral studies and; b) The field being evaluated is proposed to grant positive evaluation. If these conditions are met then: a) If the level of scientific basis is sufficient for conducting doctoral studies in every structural unit being evaluated, then the answer should be „yes“; b) If the scientific basis is not sufficient in some structural units, then those units should be listed.)		Yes, the level is sufficient. The evaluation committee has seen about 10 PhD students and has had a very positive impression. All of them had sufficient funding in complement to the state allocation. This was essentially given by their laboratory, sometimes in recognition of their work on a research project that is distinct from their thesis. They appreciate the opportunities they have to visit other laboratories and attend national and international conferences. Ancillary teaching duties and supervision of Masters students were viewed as useful training and experience for future careers. They are also involved in visits of students of high schools.

Summary assessment

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Areas of special note as appropriate (Where necessary indicate sub-fields, assessment criteria, and/or structural units which, in the committee's opinion, were of a notably high level.)		The Ecology of Global Change is a Centre of Excellence carrying out research on managed and natural ecosystems. The possession of well-equipped research stations has provided opportunities for large-scale and unique types of experimentation that may be difficult to carry out in other institutions. There are very good research groups, particularly in plant physiology and anatomy, ecophysiology, and hydrobiology. Useful research links exist with the University of Tartu and the Tartu Observatory in connection with ecosystem-atmosphere relationships and remote sensing.
Areas in need of improvement as appropriate (Where necessary indicate sub-fields of the field being evaluated, assessment criteria, and/or structural units which, in the committee's opinion, revealed significant shortcomings.)		Despite some rationalisation of structure, there are areas of commonality that exist in several of the structural units such as agriculture, forestry and environment. Further rationalisation bringing key groups together may enhance interactions and new collaboration. There are also several very small Departments. Plant growth and productivity, forestry and soil systems are significant research areas yet there is a conspicuous lack of environmental microbiology which is surprising in view of the fundamental roles of microbes in the soil environment in affecting soil structure and properties, plant growth and development, and in pathogenesis. Microbiology recruitment would greatly enhance the portfolio of life science subjects and provide useful support to several research areas. There appears to be no strategy for PI recruitment through search committees or other solicitation mechanisms. The new Chairs appear to be appointed by only an open call resulting in few applications. It is essential to try to persuade internationally significant researchers to come to the EMU by additional means. There was an expressed desire to improve recruitment of young researchers through a tenure-track system. It was also felt that new appointments were often overburdened with a heavy teaching load. It seems clear that rationalisation of teaching and research is necessary with teaching activities being reduced for successful research active groups with increased teaching involvement elsewhere. There is a wide diversity of research carried out in EMU and it seems unlikely that all can be sustained to a high level under current funding constraints. There were some uncertainties expressed about the changes in R&D grant awards and loss of EU Structural Funds and their consequences after 2020.

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Assessment proposal to the Minister of Education and Research	To grant positive evaluation	The development of research in natural sciences overall is good and complements very well the main mission of the university in agriculture and veterinary activities. This is linked with the specific geographic and ecological position of Estonia. The research environment is good and provides a good learning conditions for graduate students.

Feedback

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Feedback for institution (This question should be answered only if the institution asked for feedback from the evaluation committee in the self-report (about up to three specific areas of R&D which it finds to be currently important, e.g., related to its development plan).)	NA
Suggestions for unit, institution, state etc. (As appropriate, committee can give additional feedback for the structural unit, the institution, or the State (please specify whom feedback is directed to) according to the directive assessment criteria for regular evaluation (article 7).	In summary, we recommend that the structural changes in the EMU should be stabilized for a longer period of time so that the researchers can concentrate on research activities and may think of them in the long term. A new structure always needs time to develop and people have to grow together. New appointments will be of strategic importance. A clear vision of the possible future of small groups of research will be necessary. An important point also concerns the uncertainty of future funding in particular in terms of state funding. The state should provide clear and definite plans for the funding schemes and the funding levels for mid-term and long-term timescales to remove this uncertainty. Funding uncertainty always hinders long-term development of research directions and long-term projects.