

Estonian Higher Education Accreditation Centre

Evaluation of Research in ecology in Estonia

Institutes evaluated

Environmental Protection Institute of Estonian Agricultural University

**Evaluation dates:
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Expert team:

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Part I

General Overview

Introduction

At the request of the Estonian Higher Education Accreditation Centre, Tallinn (EHEAC), the evaluation team (hereafter named the “Evaluators”) visited Institutes in Estonia, carrying out research activities in ecology. The evaluation team comprised Prof. Risto Kalliola (University of Turku), prof. Rauni Strömmer (University of Helsinki) and prof. Alan Beeby (School of Applied Science, South Bank University)

The institutions to be evaluated were:

Environmental Protection Institute of Estonian Agricultural University (EAU)

- Research Group of Landscape Studies
- Research Group of Nature Conservation

The evaluators were provided in advance with self-assessment reports from the institutions, prepared by the members of their groups.

After a brief orientation meeting at EHEAC, the evaluators visited the institutions to be evaluated in Tartu during one day. At these meetings staff members of the various departments presented their work. During these presentations as well as during the subsequent discussions additional information about the research activities was provided. This included additional documents such as copies of published papers.

Approach to the evaluation

The evaluators were asked to:

- 1) Judge the activities of research and development in the units evaluated and the research topics implemented by them to ensure the governmental funding for internationally recognised research and development. The Team was asked to concentrate on research units (university departments, laboratories) with specific comments to sub-units, groups if necessary.
- 2) Identify deficiencies in the activities of research and development units.
- 3) Give recommendations on the development concerning research and development and research areas to the state of Estonia.

The Team received the following materials: A working schedule, principles and criteria for evaluation of the research units, evaluation guidelines for the ranking of research units, and self-evaluation reports created by the research units themselves.

On a first evaluation point, the ***quality of the research activities*** was considered. This assessment is largely based on the records of scientific publications.

| | |
|---------------------|--|
| <i>Excellent</i> | <i>The majority of the submitted works are at a high international level and virtually all others at a good international level.</i> |
| <i>Excellent to</i> | <i>At least one third of the submitted works are at a high international</i> |

| | |
|---------------------------------------|--|
| <i>good</i> | <i>level and many others at a good international level, these together comprise a clear majority.</i> |
| Good | <i>The majority of the submitted works are at least at a good international level and virtually all others at a fair international level</i> |
| <i>Good to satisfactory</i> | <i>At least one third of the submitted works are at a good international level and many others at a fair international level, these together comprise a clear majority</i> |
| Satisfactory | <i>The majority of the submitted works are at least at a fair international level</i> |
| <i>Satisfactory to unsatisfactory</i> | <i>A minority of the submitted works are at a fair international level</i> |
| Unsatisfactory | <i>None, or virtually none, of the submitted works are at a fair international level</i> |

Regarding the grading of the research activities, the evaluation team was instructed by the EHEAC to reserve the term **excellent** for groups, which were found to be among the best 10% of the European groups in the corresponding field. Similarly, the term **excellent to good** should be used if the evaluated group was found to be among the best 25 % of corresponding European groups. The full scale comprised 7 levels, in addition to the highest ones the grades are **good**, **good to satisfactory**, **satisfactory**, **satisfactory to unsatisfactory**, and **unsatisfactory**.

Secondly, the **over-all capability** of a research unit was evaluated based on a the combined assessment of the following criteria (each graded in three levels):

| | Grade 0 | Grade 1 | Grade 2 |
|--|--|--|---|
| Originality/novelty of past and ongoing research activity | descriptive, no novelty | some novelty/originality | original/novel |
| The strategy and perspective of research | no or bad strategy, no or unclear perspective for further research | fair strategy and perspective for further research | clear strategy and very perspective for further research |
| Multidisciplinarity and relevance for other research areas | no multidisciplinarity, no relevant for other research areas | some multidisciplinarity, some relevance | good multidisciplinarity, good relevance for other research areas |
| The competence of research groups and their capability for development | low competence | there is competence, but no young postgraduate and postdoctoral students | there is competence and postgraduate and postdoctoral students |
| National and international co-operation | no particular national and international co-operation | some national/international co-operation | good or tight national/international co-operation |
| Success in applying for funds and grants | no particular success | fair success | applying successfully for grants and funds |

Excellent - 12-10 (total grade), **Good** - 9-7 (total grade), **Satisfactory** - 6-4 (total grade) and **Unsatisfactory** - 3-0 (total grade).

As the result of this assessment one of the four grades **excellent**, **good**, **satisfactory** or **unsatisfactory** was given for the group.

Thirdly, the *implementation opportunities* for the research results and their importance for the Estonian society were commented.

Finally, on a fourth evaluation point *the critical comments and recommendations* were asked to given by the expert team.

Part II

General Comments

- The evaluators were pleased with the supportive environment provided by the university's senior management and their recognition of what is needed to encourage a thriving academic atmosphere. They were perceived to share a common view of the way forward with the institute.
- The University seeks to modernize and consolidate its science-based teaching and research to end the fragmentation caused by the large number of institutes and small research groups.
- Part of the University-wide strategy is to provide additional support in research project management, freeing researchers from the problems of managing budgets and other administrative tasks, which the evaluators see as very valuable.
- The University appears to take a realistic view of future resourcing, and especially the need to establish facilities by which major items of technical equipment can be shared by Estonian universities and research institutes.
- We consider that the University should seek a high international profile in its major areas of research, and to establish internationally attractive PhD programmes accordingly – some of them perhaps jointly with the University of Tartu.
- The Institute should make it a priority to recruit new PhD students from other universities and institutes. Both students and staff benefit from having their ideas and methods exposed to fresh approaches and opens up the groups to greater outside influences.
- It is also important to identify the special opportunities offered to international researchers coming to Estonia. For example, the dramatic changes in Estonian agriculture over the last decade, allied to the long database the Institute can apparently draw upon, could be of immense interest to other researchers considering the likely impact of equivalent changes currently taking place in the rest of Europe.
- Changes in agriculture and their impact should be monitored nationally and worldwide, and will have international interest. This can help to define the scientific mission of the University as a centre of expertise in this area of environmental evaluation.
- Consequently we consider that the research fields evaluated are of high importance for the country and appropriate for an agricultural university. Landscape studies provide a scientific basis for regional planning; species and ecosystem studies support conservation measures; and soil ecological studies provide a knowledge-base to support soil management.

- A number of international environmental information initiatives and procedures have close linkages with activities of this university and should be assessed against its research priorities, for example the national Clearing-House Mechanism (CHM) of biodiversity information, Global Biodiversity Information Facility (GBIF), Global Monitoring of the Environment and Security (GMES) and Infrastructure of Spatial Information and Research in Europe (INSPIRE).
- The evaluators endorse the national strategy of identifying centres of excellence, but we think this has to be operated flexibly, to allow access from emerging groups.
- We got the impression that until recently, education has been the main priority of the University, but raising the research profile, especially with regard to the Estonian centres of excellence, is also highly rated.
- We appreciate that one of the identified centres of excellence is hosted by the EAU university (BIOMI) and this represents a research area very close to some of the work evaluated here.
- This highlights the need to seek to discuss the role of the two evaluated groups within the University, to further explore how to guarantee their scientific performance. This should be part of a larger schedule of discussions and seminars to help members of each research group to define a strategy for future projects.

Part III

Evaluation of institutions and research groups

1. Environmental Protection Institute of Estonian Agricultural University (*Head: Prof. Lembit Nei*)

The main fields of scientific work of the Institute include:

- Research on rare and endangered plant and animal species in Estonia, the dynamics, conditions and influencing factors of their populations and communities.
- Landscape diversity and dynamics.
- Landscape management.
- Cultural and historical values and functions of landscape.
- Microbiological and ecological soil studies.
- Environmental chemistry.

1.2. General about the institution

- The evaluators were pleased to learn of the way the Institute had responded to the previous report and their recognition that they had been ill-prepared in their first assessment. In answer to our direct question, the previous evaluation report was considered fair and correct in its findings.

- The staff made it plain that they were willing to engage with the recommendations from the review team and welcomed the reflections from the evaluators.
- The Institute staff had begun to address some of the issues raised three years ago and their positive attitude and the well-prepared presentations were evidence of this.
- The concrete measures reported to us after the last visit, included:
 - the establishment of distinct research groups, collecting some of the disparate projects together under broad titles;
 - a reduction in the amount of teaching by some key staff (although we gained the impression that this was still rather high);
 - two initiatives seeking novel approaches from new collaborations, i.e. linking art history with landscape studies and soil ecology studies with those of wildlife population dynamics.
- However, we did not feel that the teams we evaluated had yet matured as internally coherent scientific teams that had resulted in a high level of cooperation (given potentially three years of collaboration), at least based on the publications we saw.
- In the self-assessment report, research on landscape corridors was reported under the Nature Conservation group, yet the publications about this research area seem to constitute some fundamental ideas that characterize the approach of the Landscape Study group.
- As it stands, a large number of small projects are presented, with relatively little integration between them. Also strategic planning of research priorities is weak.
- We saw no scientific contributions where the leading scientists of the two groups had combined their views and approaches. This suggests that neither of the research groups have been interacting dynamically to become intellectually distinguishable as a scientific team.
- The evaluators also wondered whether the Institute is indeed coherent, and whether it would benefit from being opened up to other groups and researchers (with the forthcoming re-organisation of the Institute/Faculty structure). For us, soil ecological studies showed little overlap with the semiotics approach, and migratory bird monitoring with electrochemical detection methods. Despite an obvious potential for interdisciplinary research, the articles produced thus far do not suggest much new research to demonstrate this.
- We noted, however, the good team spirit amongst all staff and the real sense that everybody was working together. Also the undergraduate and doctoral students interviewed by us confirmed the positive working atmosphere and good opportunities to get in contact with the international scientific community.
- We also heard only positive comments about the computer and literature facilities available for the researchers. The chemical laboratories were also considered good, though the soil laboratory we visited would undoubtedly require updating.
- We suggest that a demand from foreign researchers to work in the Institute would be a good indicator to the groups that their approaches are indeed innovative.

1.2. Research group of landscape studies (*Leading scientists: Prof. Kalev Sepp, Prof. Juhan Maiste, Prof Mari Ivask*)

Main research areas:

- Trends in land use and their impact on the quality of the environment (K. Sepp, M. Ivask, PhD student O. Hiimäe).
- Landscape management (K. Sepp, J. Maiste, M. Ivask, PhD students K. Jürimäe, A. Kaasik, O. Hiimäe, A. Tammepuu).
- Landscape values, normatives and functions (K. Sepp, J. Maiste PhD student P-K Parts)
- Ecological and landscape indicators and their thresholds (K. Sepp, M. Ivask)
- Landscape diversity and dynamics, scientific principles and methods of landscape monitoring (K. Sepp, PhD students A. Kaasik, A. Kuu)
- Landscape semiotics (aesthetic and cultural-historical connotations), Baltic *villa rustica* (J. Maiste, PhD student P.K Parts)
- Park landscape and style, genesis of Estonian manor parks from baroque to classicism (J. Maiste, PhD student S. Nurme)
- Microbiological and ecological soil studies (M. Ivask, PhD students M. Truu, A. Kuu)

Research staff

Kalev Sepp PhD, Juhan Maiste PhD, Mari Ivask PhD, Mari Nõmmela MSc, Are Kaasik MSc, Marika Truu MSc, Jaak Truu MSc, Olavi Hiimäe MSc, Sulev Nurme MSc, Anneli Kuu MSc.

General Comments

- The group comprise able scientists in their respective scientific fields. Many of the papers are produced jointly with researchers from other Tartu-based institutes. There are also young enthusiastic students and PhD researches associated to the team.
- The research papers evaluated by us are of a good average level. They do not challenge any major scientific theories nor present new ones, but they do correspond with the quality and standard of research papers in their respective fields. However, not too much original data has been published and recycling of ideas occurs.
- We appreciate the research group's self-confidence and assured determination to improve their scientific performance in all ways.
- Some members of the group have a recognized position among landscape researchers in Europe, evidenced by active participation in international conferences (including their organization) and networks, capture of international research funding, and writing relevant scientific publications.
- In an international context this research team appears, however, part of the "Tartu landscape research school", which includes the landscape ecology research group of the University of Tartu.
- The group members themselves considered that they have a scientific profile of their own, even though they cooperate at times with Tartu. Their particular strength would be in their ability to combine aspects of the nature and the human culture (particularly landscape architecture and semiosphere). We are not yet fully convinced about their success and evidence of shared thinking amongst the team, or distinct breakthroughs recognized by the wider scientific community, is missing. The list of MSc theses titles includes some where

nature and culture are seen together but this indication is too weak to be considered in this evaluation. Nevertheless, we recognize the potential of the new collaboration.

- The landscape group seeks to define a new paradigm in landscape studies, informed by the different contributions that can be made by members of the team, but have yet to define:
 - the failures of existing paradigms, other than omitting human constructs of landscapes,
 - what the new paradigm should do, and
 - the means by which the new paradigm will be developed and tested.
- An effective integration of the landscape studies is needed if this shift is to be made. We observe both from the self-assessment document and from the papers that all projects of this diverse group still remain relatively independent and are not obviously developing the new initiative.
- Given the above, we are hesitant to confirm any real synergy thus far achieved between the distinctive research approaches of landscape ecology, soil biology and art history. It may need a new generation of scientists or other contributors to ensure that the whole effort is not relying on a small number of people.
- Landscape architecture seems to be relatively undeveloped in the scientific profile of this study group despite its importance in undergraduate teaching. We consider that landscape architecture, based on a highly-integrated scientific foundation, could be one research direction that allows the institute to distinguish itself from Tartu University.
- The group presented “keywords of main research fields”, effectively a list of their current research topics. Listing them does not integrate them and we believe the group needs to arrive at a well-defined content-based scientific strategy for its future development.

Evaluation of Research Activities

On the basis of the scientific results published thus far, the team evaluators judged the overall quality of the research group to be *good to satisfactory*.

Evaluation of Overall Capability

The team evaluators judged the overall capacity of the research group to be *good*.

| | Grade |
|--|------------|
| Originality/novelty of past and ongoing research activity | 1 |
| The strategy and perspective of research | 0,5 |
| Multidisciplinarity and relevance for other research areas | 1 |
| The competence of research groups and their capability for development | 1,5 |
| National and international co-operation | 2 |
| Success in applying for funds and grants | 2 |

The implementation opportunities for the research results and their importance for Estonian society

- The research of the group has a special significance in the Estonian context and is suited to an agricultural university whose remit is to contribute to land use planning and the scientific understanding underpinning it.

- Because the Estonian landscape is facing further dramatic change in the near future, specialists trained by this research group will be needed, both in the public sector and in the private companies involved in environmental consultation and/or regional planning.
- Landscape architecture might underpin the drive to find novel solutions to help manage this scale of change, where ecological, functional and aesthetic aspects should be well integrated.
- Nationally and for an agricultural university, it is important to maintain enough scientific power in research on soils as living systems, though not necessarily as part of a landscape research group.

Recommendations

- The group should be encouraged to derive a content-based strategic plan by which their novel approach can result in new findings and hypotheses
The evaluators recommend that the research group seek to publish a joint theory-building paper within a period of one year. It should articulate their thinking and show how their trans-disciplinary approach will lead to a unique perspective on observing and managing landscapes. We suggest that this should appear in an international, peer-reviewed journal and be used as a criterion by which their success in formulating their ideas can be judged. Part of the goal, again, has to be an international reputation, and this will prove a fair test of the extent to which the group's ideas have been developed. Further, we believe this will
 - help the team to collectively arrive at a synthesis of their ideas,
 - expose these ideas to the scrutiny of international peers,
 - help to raise the profile of the group and
 - help to define new research directions and distinct projects that promote their strategy.
- Related to the above, the group should review, in collaboration with other landscape researchers in Tartu, how to gain the highest visibility and attractiveness for the Tartu-based school of landscape research in the international academic community. Currently, Tartu as a whole is very close to the threshold of becoming an attractive centre for post-doctoral researchers specialized to landscape questions.

1.3. Research group of nature conservation (*Leading scientists: Dr. Aivar Leito, Dr. Mart Külvik, Prof. Mari Ivask*)

The current research group was formed in 2000, after the previous evaluation of scientific research at the EPI. The aim of the group is to build up a research capacity on nature conservation with the help of internal and external scientific collaboration. The study group incorporates other researchers within the Institute, and has strong links also with the Institute of Zoology and Botany.

The main research fields include conservation aspects of rare, endangered and problematic species, habitats and key elements of landscapes:

- plant species and communities (Dr. Ülle Kukk, MSc Anneli Palo);
- introduced and naturalised plants (MSc Merle Mägi);
- ornithological studies (Dr. Aivar Leito);

- soil biodiversity aspects (Prof. Mari Ivask).

Research staff

Aivar Leito (Senior Researcher, PhD, Head of Laboratory)

Mart Külvik (Associate Prof., PhD)

Mari Ivask (Prof., PhD)

Kalev Sepp (Prof., PhD, Head of Laboratory)

Ülle Kukk (Senior Researcher, PhD)

Anneli Palo (Researcher, MSc, PhD student)

Merle Mägi (Lecturer, MSc, PhD student)

Target-funding projects:

Project: “THE STRUCTURE, CONDITION AND DYNAMICS OF ENDANGERED AND PROTECTED SPECIES, COMMUNITIES, HABITATS AND LANDSCAPES AND THEIR CONSERVATION APPLICATIONS IN ESTONIA” (reg no. 0170133s98): 1998 → 350 000 kr.; 1999 → 465 000 kr.; 2000 → 419 000 kr.;

Project: “THE STRUCTURE, CONDITION AND DYNAMICS OF RARE, ENDANGERED AND PROBLEMATIC SPECIES, COMMUNITIES, HABITATS AND LANDSCAPES IN RELATION THEIR PROTECTION IN ESTONIA” (reg. no 0411767s01): 2001 → 520 000 kr.; 2002 → 416 000 kr.; 2003 → 416 000 kr.

General Comments

- This group is marked by scientists with a high level of expertise and a long record of collecting data of both national, and in some cases, international significance.
- They have published a good number of articles, though these have, for the most part, been largely descriptive and inventory-based. It is also apparent that the first authors of many of the recent papers are not drawn from the group.
- Much of its work has been on ESF-funded, small scale projects but the group recognise a need to move to a more integrative research that builds upon Institute strengths in landscape ecology.
- The group have articulated a research strategy that calls upon further data on “real populations and communities”, aiming to explain processes and predict outcomes.
- The evaluators believe that this is indeed an appropriate direction though the strategy has to be much more specific including how it will deploy its academic resources to meet this challenge.
- In this regard, the group might benefit from clear leadership, helping to focus new proposals and resources to meet this strategy.
- The evaluators welcome this development and would encourage the group to further strengthen the scientific basis of their work by developing experimental-based projects that test concepts and hypotheses and make predictions.
- Nevertheless, given the nature of the methodology and the small number of people involved in the soil ecology group this would represent a large demand on the existing staff. The new initiative in relating soil biodiversity with wildfowl abundance is an innovative step that may indeed produce insights into the processes behind some of these changes.

- Given the immense database this group has Estonian biodiversity there is further scope for extending the new initiative to the plant population studies.
- Laboratory resources do not seem to limit the research and there is a willingness to call upon equipment and expertise from elsewhere.
- The work on ecological networks is poorly integrated with the other work in the group and would seem to have been more logically included in the landscape studies group.
- Nevertheless, this too might be a fruitful source of hypotheses to test some of the ecological processes underlying the national patterns of abundance and diversity.
- After (up to) three years of collaboration, the evaluators felt that there should have been more evidence, both in terms of published work and in the project titles, of collaborative research. The ecological network research especially does not seem to draw upon the existing research strengths, and there is still a large measure of project fragmentation.

Evaluation of Research Activities

On the basis of the scientific results published thus far, the team evaluators judged the overall quality of the research group to be *satisfactory*.

Evaluation of Overall Capability

The team evaluators judged the overall capacity of the research group to be *good to satisfactory*.

| | Grade |
|--|-------------|
| Originality/novelty of past and ongoing research activity | 1 |
| The strategy and perspective of research | 0.75 |
| Multidisciplinarity and relevance for other research areas | 1 |
| The competence of research groups and their capability for development | 1.5 |
| National and international co-operation | 1.25 |
| Success in applying for funds and grants | 1 |

The implementation opportunities for the research results and their importance for Estonian society

- The main objective of the research group has been to detail the abundance and diversity of some key plant and animal groups, and such autecological studies have immense significance for a complete inventory of Estonian wildlife.
- The group provides valuable information on a number of endangered species in Estonia and as such complements the work of others in the Institute of Zoology and Botany.
- Similarly, the soil ecological work can draw upon a long data-series that will be of immense value in measuring the scale and speed of change in terrestrial habitats throughout Estonia.
- The evaluators believe that a thriving soil ecology group is essential to an agricultural university serving Estonia, particularly if it would move to an ecosystem-based approach to provide a firmer theoretical foundation for its work.

Recommendations

- The group should consider appointing a leader with the remit of devising an explicit strategy for its future development
- An experimental and process-based approach seeking explanations for the observed patterns is the logical development of past work and is to be encouraged.
- If the group does move to a more analytical approach in its studies, much of the coherence will come from the soil ecology work. A strategy that anticipates this is essential.
- In addition, the evaluators recommend the appointment of a second soil ecologist which could make such an approach tractable in the future and the strategy realistic.
- The existing microbiological facilities could be usefully upgraded, and a new laboratory, with a larger number of PhD students would aid the development of this work.
- The extent to which the work on ecological networks properly belongs in this group should be part of a review of its strategy.
- The relationship with the Institute of Zoology and Botany, and especially BIOMI, needs to be defined, especially if there is a significant overlap of effort.

Part IV

Summary of evaluation

1. The research groups in landscape studies and nature conservation were reviewed and shown to have made a significant improvement since they were last evaluated.
2. The Institute clearly regards these groupings as fluid, at least in terms of their senior staff and this raises questions of whether the groupings are necessary at all.
3. Both groups have developed new initiatives, based on novel combinations of research interest, but it is not yet clear that these are well-defined either in terms of a research strategy or of tangible and publishable results.
4. The review team recognise that these initiatives could be productive, but believe that further work is needed to demonstrate their viability.
5. Resources are not a major issue, except that staffing in one or two key areas may be critical for the viability of new project development and much seems to depend on a small number of staff.
6. The review team see much benefit in opening up the institute, to collaborations with the wider University and to academic exchange (especially at postgraduate level), with an aim to establish a high international profile that might attract foreign researchers.

Part V

Conclusions and Recommendations

- This is the second evaluation of the research activities that were assessed already in the year of 2000: a clear improvement in performance was evident.
- We appreciated the determination and enthusiasm we could see in all levels of the University and its personnel, aiming to improve the scientific quality of its research and education based on it.
- We consider that it is important for the Agricultural University to assess its special responsibility in the changing society and to join its forces with the University of Tartu whenever appropriate.
- The Environmental Protection Institute in its current form provides an encouraging working environment for its researchers but does not show a genuine interdisciplinary research to the level we expected.
- Both research groups evaluated by us are able to produce research papers to international journals though much of this work is descriptive in nature.
- Both groups show only weak strategies to get into a deeper level of scientific research, characterised by theory-based approach.
- The Landscape Research group ought to demonstrate that their chosen research orientation is indeed viable and will provide a credible basis for innovative research.

- The Nature Protection group lacks scientific leadership and should see ways to shift the focus of its research from descriptive biology to theory-based science.
- We recommend that the University will assess possibilities to integrate some of the research activities addressed by our evaluation with the corresponding centre of excellence (BIOMI) of the same University.
- Generally, we consider that the international attractiveness of the University and its research groups, seen by post-doctoral students and other researchers seeking a good place to work in, would be a good indicator of their scientific performance.

VI. Acknowledgements

We thank the staff of the Estonian Higher Education Accreditation Centre and the staff of the visited institutions. They provided us with detailed self-assessment reports, were most hospitable, demonstrated their facilities and engaged in enlightened discussion about the future potential for their research. They made our stay a most enjoyable experience. We wish them all the very best in their future endeavours.

Tallinn, 13.12. 2003

The evaluating team:

Risto Kalliola_____

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Rauni Strömmer_____