# FINAL REPORT

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<th>The Name of the Institution to be evaluated</th>
<th>Forest Research and Management Institute (ICAS)</th>
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CONCLUSIONS AND RECOMMENDATIONS

The team has evaluated ICAS on the basis of the self-evaluation documents, presentations by the scientific director and the team leaders, discussion with the scientific council and administrative personnel, and visits to laboratories, stations and facilities. Two days were spent in Bucharest and two days in Brasov.

The main strengths of ICAS result to be:
- Consolidated expertise in the forestry research-development sector and reference institution of Romanian forestry
- Internationally recognized as research partners in the field of environmental monitoring
- Robust and long-term databases, permanent experimental plots and germplasm collection available
- Outstanding infrastructure

The main weakness is:
- Medium-low quality of scientific production, namely not available in peer-reviewed high-impact journals, compared with the elevated capacity of attracting funds and the number of scientists

In detail:
- Only 30 AIS papers were published over the evaluated period, i.e. 6 per year, with a low average citation (3-4 per paper). Ten of them had a personnel member as a first author. Generally speaking, the number is very low. However, the concept of the AIS metric is unclear to the evaluators. 337 other papers were published, out of which 202 are articles published in journals indexed in international databases, i.e. 40 papers per year, 2.4 papers per certified scientific researcher in 5 years. The number of citations is unfortunately not shown for the so-called other papers. However, these papers are accessible to the international community and are a major output of ICAS. 17 of these papers are included in the ISI database, so that the number of ISI papers published in 2007-2011 is 46, i.e. 0.54 papers per researcher, which is still a very low figure. In addition, 62 works are published in conference proceedings and 71 are books and book chapters. In 230 of the – so called – other papers, the first author was from ICAS.
- Although attending international meetings is an opportunity to get contacts and visibility, publishing in conference proceedings is not rewarding in terms of paper quality and impact.
- An analysis of the paper titles shows that ICAS is very competent in traditional forest classic genetics, environmental monitoring, forest ecology and protection, dendrochronology, biodiversity, and is developing internationally-competitive expertise in the carbon budget of European forests.
- ICAS has been building a consolidated reputation at the international level both by participating in international projects and bilateral agreements, and by its membership in several organizations. In particular, ICAS has developed an extended network of permanent experimental plots integrated at an European level. At a national level, ICAS collaborates with forest local authorities, private forest owners and universities.
- ICAS obtained 3 patents and submitted requests for additional 4 patents, all of them were registered only in Romania. The subject of the patents ranges from food to therapeutic use, and to non-wood and wood technology. Most of the subjects may be competitive also in an international context and reflect a traditional expertise of Romania in non-wood forest products.
• There is a very high capacity of attracting funds, with a total of 244 projects (out of which only 14 projects -14% were from international sources and 34 projects -2.3% from private sources). Most of the projects are thus technical projects with practical applications, which are mainly ordered by the national forestry authorities. A lot of the effort is dedicated to commercial activities which supply 50% of the annual budget, but do not translate into science.

• ICAS is very active in communication, in particular with the national forestry authorities, to which ICAS provides fundamental technical assistance.

• Several dissemination tools have been used. Worth mentioning are: i) the Forestry Publishing House, which publishes scientific and technical books in the field of forestry and environmental sciences (52 works in the period 2007-2011); ii) the scientific journal *Annals of Forest Research*, which publishes in English only, on topics dealing with forestry and environmental sciences. It is also indexed in many major international databases, e.g. ISI Thompson, Scopus, CAB Abstracts. Very important, the journal was able to get an Impact Factor from ISI, which will be very beneficial for the whole forest science of Romania.

• A major weakness in dissemination is the low quality of the institutional website.

• The average age of R&D staff ranged from 38 years in 2007 to 40 years in 2011 and is thus below the recommended threshold of 45 years. Out of R&D staff, 43 hold a PhD, 16 graduated during 2007-2011, 19 are PhD students, 24 are university professors, and only 2 are PhD supervisors. Six young people were recruited.

• The total number of employees in 2011 was 809, out of which 469 R&D personnel and 340 technical staff. The R&D personnel includes 85 certified scientific researchers, 94 technological development engineers and 252 auxiliary staff. Only 38 people are administrative staff, so that the ratio R&D:administrative staff is 11:1, which is very low given the high amount of projects ICAS deals with. Although there was no major complain from R&D staff about the support they get from the administration and the efficiency of the administrative staff, the Research personnel prepares the financial reports for every project. It would be beneficial to streamline this procedure and allow the researchers to dedicate all their time to science.

• A high investment in research capacities was carried out. In 2007-2011 3.2 M€ were invested, half from external projects, and half from institutional funds. Many laboratories were recently modernized. The quality of research infrastructure is generally high, including facilities for biodiversity investigation (e.g. arboreta, seed collection, herbarium), for long-term environmental monitoring (e.g. permanent plots, remote sensing, data-bases) as well as a number of sophisticated instruments for soil, plant and atmosphere analyses. Since the last year, access to all electronic journal databases is provided. The rate of infrastructure exploitation is probably very high.

• The criteria for motivating people are not well defined. Mechanisms for effective promotion (e.g. certification of researchers) and encouragement would increase motivation and merit.

• The development plan directions are coherent and in line with the present expertise of ICAS. In many teams, the development directions are in agreement with the most updated trends of European research.

• The recruitment policy is only driven by the accessibility of projects (funds) and there is no serious attempt to attract excellent graduates of academic institutions.

• A critical mass of scientists in the critical areas for the institutional development is available in ICAS in general as well as in every team and station. Team E2, E6 and E1 are the most well performing in terms of publications and international visibility. E5 has the poorest scientific performance as it did not publish any ISI paper over the evaluated period. All teams, however, have specific fields of interest and are very collaborative with each other so that the teams' strategies have many common aspects.
JUSTIFICATION OF MARKS

C1: Quality of R&D activities and their results
   Mark: 3.7
   - Excellent production quantity, although much effort is devoted to technical assistance requested by national forestry authorities and self-financing. This results into an average medium-low quality of papers.
   - The level of science is however good and competitive into an international context.
   - The potential for competitive science is good but is not properly exploited.
   - Excellent capacity of attracting funds.
   - Good dissemination skills.
   - Leading skills as demonstrated by the high percentage of first authors in the papers.
   - Poor ICAS website.
   - Too much effort dedicated to commercial activities.

C2: Human resources quality
   Mark: 4.3
   - Great human potential for all major research directions in the forestry domain.
   - Good ability to recruit and support personnel, but better selection mechanisms may be applied.
   - A large number of the personnel is dedicated to commercial activities.
   - An assessment of the individual performance is missing.
   - A critical mass of scientists is available in ICAS in general as well as in every team and station.

C3: Quality of infrastructure and its rate of exploitation
   Mark: 4.4
   - Vast patrimony in terms of land, buildings and research infrastructures.
   - No digital data available on-line.

C4: Management efficiency and quality of the research environment
   Mark: 4.2
   - Management efficiency and quality of the research environment complies with the best European and International practices.
   - Good collaboration among different personnel subgroups (R&D, administration, auxiliary)
   - Insufficient motivational mechanisms.
   - Too much administratrive load for researchers.

C5: Quality and credibility of the institutional developmental plan
   Mark: 4.5
   - Quality and credibility of the institutional development plan are good.
   - The main strength is the continuation of the long ICAS tradition in forest basic and applied science.
   - The main weakness is still the low quality of the journals selected for publication.
Team E1 - Dendrometrics, forest management planning and forest monitoring

R & D activity

The research activity between 2007 and 2011 is characterized by an integrated and multidisciplinary approach aimed at dendrometry, forest management planning, dendrochronology and long-term monitoring of forest ecosystems in condition of global change. Romania is predetermined for large-scale comparative experiments established in diverse ecological conditions and international cooperation not only within the Carpathians but Europe-wide.

Human Resources

Well defined research team with a number of qualified scientists and PhD holders. Head of the team is a respected scientist with good scientific vision and experience. The team has 15 attested researchers (6 senior researchers, 2 young researcher, 4 PhD students and 3 master students), 6 technological development engineer and also 10 persons as technical assistants, with a mean age below 40 years.

Infrastructures

Team E1 possess a network of experiments valuable for long-term monitoring and research. Team is well equipped with the devices for continuous monitoring of trees growth, the field equipment for collection of data in ecological and monitoring experiments, laboratory for chemical analysis and a laboratory of dendrochronology and wood anatomy. The management of the large volumes of raw data obtained from research networks is achieved through integrated management system of databases and their statistical processing is done by general or specialized statistical software and/or developed by the research team.

Management and Research Activities

During the evaluation period, the team participated in five international projects and 29 national projects. In a total of 28 projects (3 international projects and 25 national projects), the research team has acted as project manager and for 6 as scientific responsible (2 international projects and four national projects). In the recent period, they coordinated GEDEFOR nucleus program aimed at monitoring of forest vegetation in the context of global environmental change. Positive aspect of the research team activities is their participation in international programs aimed at monitoring of forest ecosystems as well as the projects accepted for financing within the LIFE+ and Human Resources scheme. The other projects are under the reviewing process. Good publication records in ISI journals, but with reserves for improvement.

Development Plan

The plan is aimed at the continuation of previous research and monitoring of forest ecosystems. A clear formulation of more specific tasks in terms of working hypotheses would be beneficial.

General Feedback

One of the three top teams within ICAS with high perspective for further development and increasing publication activities.
Team E2 – Forest ecology

R&D activity

The research of the team is very well organized with 6 main programs (Forest environment and communities; Ecophysiological studies; Climate change, disturbance regimes; Old-growth forests biodiversity; Forest resources assessment). They significantly contribute to the recording of a lot of data, very useful for the country but also for the international community. Their work allows the team to produce a lot of indicators (maps, databases,...) on both old-growth forests evolution as well as current disturbance regimes and their influence on the evolution of natural and managed forests.

Human Resources

The members of the research team are 33 with 20 researchers (2 CS1, 1 CS2, 10 CS3, 2 CS, 5 AS). The average age of the staff is 40 years and they have a reserve of young scientist (10 CS3). 10 members have a PhD degree, 6 members are PhD students and 5 members are associate professors/lecturers in forest sciences. They have several good scientists.

Infrastructures

The infrastructure is very good and adequate for their goals: Soil and forest vegetation analysis laboratory; National Forest Inventory, Botanical scientific collection - Herbarium with over 30,000 specimens; Greenhouse gas chromatography laboratory etc...

Management & Research Environment

Projects are numerous (81), and about 10 are international (and efficiently managed). Relationships between the different groups of this team seem to be excellent but it is difficult to estimate their relationships with other teams. They have the best quality papers in ICAS with 16 articles published in ISI journals (6 as first author) and one was published in Nature Geoscience. 55 scientific articles were published in journals indexed in international databases, 28 books/book chapters: 12 of them in foreign publishing houses. They also have 2 patents (national) and 4 patents requests.

General Feedback

This team has developed new and efficient skills. They have oriented their scientific plan to respond to global change questions such as forest adaptation to global changes, long-term observations of fluxes of CO2, CH4, N2O between the biosphere and the atmosphere, and how they are affected by climate and forest management. They also introduce new modelling approaches in their programs for the management for monitoring carbon stocks and greenhouse gas fluxes (emissions and sinks). This team has an excellent visibility at the international level. They published a lot of good papers and their production in journals with a high ranking will certainly increase rapidly.
Team E3 – Forest genetics and tree breeding

R & D activity

The main activities of the team were aimed at gene conservation activities. They developed some ex situ conservation methods and are paying attention to the development of micropropagation methods. They started to work with population genetics of tree species by applying molecular methods.

Human Resources

The team is composed of 28 persons employed as permanent staff. Among them, 13 are attested researchers (2 CS1, 3 CSII, 4CS III, 3CS and 1 AS), 8 of them hold PhD diploma, 3 are PhD students, and 4 are young researchers. The team is split into three groups (Bucharest, Simeria and Campulung Moldovenesc) with no clear signs of effective cooperation. The team in Bucharest is mostly aimed at gene conservation and breeding, while the other teams (Simeria and Campulung Moldovenesc) are dealing among others also with population genetic studies.

Infrastructure

The team has under supervision a large network of breeding experiments (provenance and progeny trials, hybridization experiments, arboreta etc.), most of them long-term. The team has also two molecular labs and they plan to develop a third one. In this respect centralization of molecular lab facilities and human resources would improve substantially the research effectiveness and research environment.

Management and Research Activities

Twenty-eight national projects have been elaborated within the previous 5 years and nine international ones (TREEBREEDEX, EUFORGEN, EUFGIS; Bilateral cooperation with Bulgaria, Austria, Germany and participation in two COST Actions). In the framework of national project proposals ICAS is the project coordinator and the project partners are from two universities, one national research institute and the National Forest Administration (ROMSILVA) as co-financing partner and end user. The project "Designing trees for the future" (TREES4FUTURE) was approved under the FP 7 Programme. Publication activity within the last years was not sufficient and did not reflect the potential of the working group. There were only three ISI papers published by the Simeria group.

Development Plan

The development plan is aimed at the continuation of the gene conservation activities, maintaining the breeding experiments and tests and only partially on the application of the molecular genetics. There are missing clear scientific visions for further research proposals using both molecular methods and breeding. Since the team possesses long-term breeding experiments it is expected to start with their synthetic evaluation using modern methods of mathematical modeling.

General Feedback

The team did not show significant progress within the evaluating period and the number of publications does not correspond with its potential. The reconstruction of the team is considered as necessary for the improvement of further research and formulation of new projects.
Team E4 – Wildlife biology and management

R & D activity

The team carries out very important activities such as: monitoring of wildlife and biodiversity management, increasing hunting and fishing potential, genetics of hunting species, development of breeding technology.

Human resources

The team consists of 18 people is dynamic, enthusiastic and competent, with young researchers attending training courses in relevant subjects, both in Romania and abroad.

Infrastructures

The infrastructures are good and adequate in particular for field work. The laboratory equipment is sufficient.

Management & Research Environment

Under evaluated period, 22 projects, from which 21 conducted by members of the team, have been conducted. As mentioned in the self-evaluation documentation, the research results of the team are used by managers of the hunting units, several Ministries, environmental protection agencies, administrators and custodians of protected areas (including Natura 2000 sites), environmental NGOs, the state and private administration. Although the potential of their activities in terms of publication is great the results were published preferentially in books (7) and book chapters (2), and unfortunately only three ISI papers were published in 2007-2011, two of them with relative influence score. The team is very active in dissemination of the results through participations in national and international symposiums, media communicates etc.

Developmental plan

The main innovation of the development plan is the implementation of breeding technologies to improve fish species yield, which is an interesting idea.

General feedback

The team is capable and the infrastructure is good, although there are not enough publications.
Team E5 - Silvotechnics and ecological reconstruction

R & D activity

The team is working with afforestation, ecological reconstruction, management of watersheds, forest and land degraded sites, and silvobiology. From the description of the activities, this sounds mostly a technical work, representing a continuation of the Romanian forestry tradition for the sustainable management of natural resources. They managed 53 projects, but did not produce any ISI paper in the period 2007-2011.

Human resources

The team has an appropriate critical mass of researchers (9) and a total of 29 personnel members.

Infrastructures

The team manages 175 permanent experimental research plots, 5 of them having devices, instruments and equipment located "in situ" for forest hydrology research. Other equipment is available but details are missing.

Management & Research Environment

The team leader is young and motivated.

Developmental plan

Clear research directions are not addressed in the development plan, while the focus is mostly on the development of techniques.

General feedback

This is the poorest ICAS team in terms of scientific performance (no ISI papers). This is likely due to a narrow scientific focus. It may be helpful to extend the focus from mountain forests only to the whole Romanian environment by addressing emerging societal needs such as urban forestry and arboriculture. Much attention should be dedicated to publishing in peer-reviewed journals.
Team E6 – Forest protection

R & D activity

This team’s research activity, i.e. forest protection, includes projects in wide areas of forest entomology, phytopathology and mycology; all these on the perspective of the climate change influence on pest dynamics.

Human Resources

The team includes 18 researchers and 9 technical and lab assistants, who is an appropriate critical mass for the mid term planned activities. Team leader declared a policy to ensure a good age and sex ration balance, and to support the continuity in the field, by hiring young researchers. Maintaining and developing a balanced team, with high expertise rank, by continuous training is also a priority.

Infrastructure

There are six laboratories associated with these activities including real time PCR. The field equipment is also adequate.

Management & Research Environment

The team leader is an experienced researcher. The team has good record of attracting founds, with an impressive number of 61 projects/contracts completed or ongoing being financed from public, private, and national sources, totaling nearly 2Mil Euro. The team is involved also in 3 other international projects.

Although the team has a wealthy number of publications (108), the ratio of paper published in ISI journals is low, with only 8 papers published under the evaluation period in journals with relative influence score >0.

Members of the team hold also 2 patents in process of evaluation on OSIM (1 published in Buletinul Oficial de Proprietate Intelectuală), and 4 scientific awards of national Society „Progresul Silvic” („Forest Progress”) with „diploma of excellence” for „forest book” (2007-2009);

Developmental Plan

The future directions of E6 team are well related to those of other teams, such as: conservation of species and habitats of national interest; invasive species (insects, fungi, oomycetes, plants, etc.); management and ecological restoration of stands affected by stress factors; wood (and wooden products) protection; genetic variability of pathogens; tree responses to stress factors.

General feedback

This is a large group with very good infrastructure and seems to have a large database. The team is among those well performing in terms of publications, however the number of only 8 ISI papers is well under the observed potential. A better exploitation of the results in terms of high quality publication is recommended.
Team E7 – Forestry geomatics

R & D activity

The Geomatics team activity deals with techniques and technologies of collecting, computing, and exploitation of data and information from earth surface (geospatial data/information) applied in forestry (GIS, remote sensing, terrestrial data collection with specific advanced devices).

Human Resources

There are 12 members, including five researchers (but no certified researchers). The expertise of the group is mostly technical. The critical mass is appropriate for the performed activities.

Infrastructure

State of the art equipment is available, including equipment for imaging and monitoring.

Management & Research Environment

The team was involved in 51 projects with a cumulative budget of approximate 1.5 Mil Euros. One of them was bi-lateral co-operation (Romania- Flemish region, Belgium). Collaboration exists with the University of Wisconsin-Madison for a project submitted by the US partners to NASA-Land Use and Land Cover Program. The existed wealthy budget was used mainly for infrastructure, and the results obtained in the above mentioned projects were translated only onto two ISI publications.

Developmental Plan

The focus of the development plan is on the application of methodologies. The development of scientifically-sound research hypotheses is recommended.

General feedback

This is a rather technical team mostly acting as a support to the science carried out in other teams. A more ambitious approach in research should be developed.
SPECIFIC RECOMMENDATIONS FOR THE FUTURE

The average score of ICAS is 4.22 which corresponds to the upper end of the overall certification level A (3.5-4.5).

The following measures are suggested, where the first bullet point is the most important one:

- More ambitious approach in publications: submit preferentially to high-impact ISI journals.
- The participation to national/international meetings should produce peer-reviewed papers.
- Books should be intended as a collection of studies already published in peer-reviewed journals.
- Securing an annual budget would reduce the Development activities and translate into beneficial effects on the Research activities.
- 10-15 personnel members may be moved from Development to Research activities.
- Assessment of research staff should be carried out regularly and based on clear indicators, in particular the publication of peer-reviewed papers, and translated into a financial reward.
- Young scientists should visit foreign top-quality laboratories for training, experimental activities and processing ICAS databases, to be translated into peer-reviewed papers.
- In particular, training abroad in molecular biology is recommended which implies long visits (>5-6 months).
- Clear guidelines and rules for PhD students should be established and follow international standards.
- A streamlining of the molecular biology labs is suggested, with the aim of favoring the set-up of one only internationally-competitive large facility (including biotechnology, bioinformatics, -omics). This large lab can be a common facility platform for all ICAS stations and teams as well as at national level.
- ICAS publications and the large and valuable data-bases collected by ICAS over the time should be digitalized and made available on-line to other scientists by developing an ICAS web portal.
- The Research personnel prepares the financial reports for every project. It would be beneficial to streamline this procedure and allow the researchers to dedicate all their time to science.
- To improve the transparency of decisions, it is recommended that the Scientific Council includes external (not-ICAS) members, possibly top-level scientists at the international level. This would also help the quality of science.
- The recruitment policy should be addressed to select well-trained scientists from university graduates, with a good record of publications, and scientists back from training periods abroad, in particular to fill gaps of knowledge existing in ICAS.
- A clear strategy for stimulating the development of new research directions should be formulated.

It is worth saying that most of the above points have been satisfactorily addressed in the development plan, which suggests ICAS is aware of how to improve its performance.

Proposed certification level: A (average mark 4.22)
**Forest Research and Management Institute (ICAS)**

Proposed certification level: A (average score 4.22)

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**Observers**

1. Coordinating Authority – Gheorghe SIN
2. CCCDI Representative – Ion PIRNĂ
3. ANCS Representative – Simona MĂLUREANU

Proposed Certification level: A

Date: May 26, 2012